

2017 Annual Water Report



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1.0 Introduction

Water suppliers, under their Operating Permit and conditions, are required to provide an annual report to their users with information such as explanation of water source, water test results, maintenance programs and improvements to the water system. The following document summarizes these requirements. City of Parksville operating conditions are shown in Appendix G.

This report has been submitted to Island Health and it can be found on the City of Parksville website at www.parksville.ca.

2.0 Parksville Water System

The City of Parksville has approximately 4,500 water connections serving over 11,000 permanent and seasonal residents as well as supplying water to the Regional District of Nanaimo (Nanosee Bay Peninsula system) in the summer months.

These users get their drinking water from three sources.

- Englishman River
- Springwood Well Field
- Railway Well Field

The water is treated using either liquid or gaseous chlorine and stored in four reservoirs at both ends of the City.



Water Treatment Plant
Construction—River Crossing

2.1 Groundwater Wells

The City's groundwater is pumped from a confined quadra sands aquifer that runs underground alongside the railway tracks from Trill Drive to the City's boundary in the southwest. The City currently has 16 production wells ranging from 2.0 l/s (25.23 IGPM) to 8.6 l/s (113.5 IGPM). See **Appendix A** for well locations.

Well Name	Pump intake (m)	Production (l/s)
Springwood Well #1	22.8	2.1
Springwood Well #3	30.36	4.4
Springwood Well #5	30.52	-
Springwood Well #6	31.8	3.7
Springwood Well #7	22.35	11.1
Springwood Well #8	23.71	9.6
Springwood Well #9	Under construction	Under construction
Springwood Well #10	32.18	7.3
Springwood Well #11	30.42	5.8
Railway Well#1	35	4.3
Railway Well#2	34.15	5.5
Railway Well#3	38.46	1.4
Railway Well#4	35.67	2.5
Railway Well#5	36	4.9
Railway Well#6	35	2.4
Railway Well#7	35	3.2
Railway Well #8	35.68	3.4
Industrial Well#8	-	-

Pump Depth and Production Information

2.2 River Intake

Between May and mid October, the City pumped water from the Englishman River at a maximum rate of 105 l/s (1390 IGPM) to keep up with summer demands. The water in the Englishman river is partially supplied from the Arrowsmith Dam. The Ministry of Environment, Fisheries and the Arrowsmith Water Service (AWS) developed an operating rule curve in an effort to conserve reservoir storage water for critical fisheries rearing periods. A minimum flow is released into the river based on this curve between June and October .



A new intake, pump station, water treatment plant and transmission mains are currently being built with the intake completed at the end of 2017.

2.3 Arrowsmith Dam

The City of Parksville, the Regional District of Nanaimo, and the Town of Qualicum are partners in the Arrowsmith Water Service (AWS). A concrete gravity dam is located at Arrowsmith Lake about 19km south of Parksville. It was commissioned in September 2000. The dam has a capacity of 9,000,000 m³ and is operated and maintained by City of Parksville staff. Water is released to the Englishman River through two pipes, a 900 mm and a 600 mm with flows and lake levels monitored by the City's Supervisory Control and Data Acquisition (SCADA) system.

See **Appendix B** for Arrowsmith Dam Lakes Levels 2017.

2.4 Reservoirs

Water that has been pumped either from the ground or from the river is stored in four reservoirs. Reservoirs numbers 1, 2 and 4 are located in the Springwood Water Complex on Despard Road. These three are concrete with two being partially below ground and one above. Storage capacities are:

- Reservoir #1 - 616 m³ (135,500 Imp. gal).
- Reservoir #2 - 2023 m³ (445,000 Imp. gal)
- Reservoir #4 - 4559 m³ (1,000,000 Imp. gal).

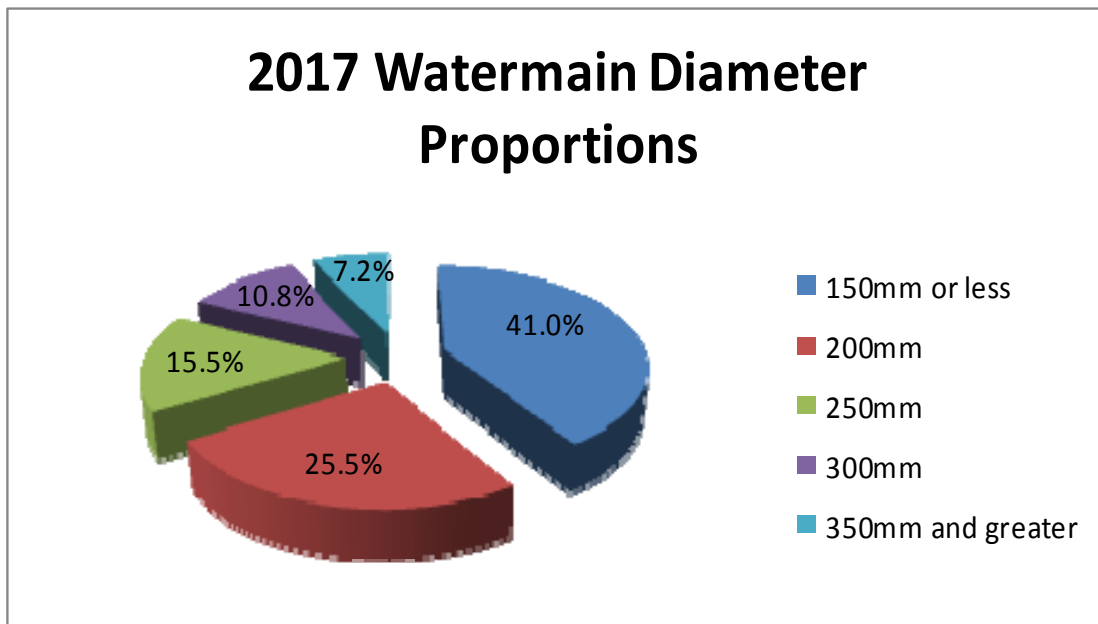
There are two additional reservoirs at the Top Bridge Park area, numbers 3 and 5. Reservoir #5 is a glass fused steel tank, Reservoir #3 is a steel tank although currently not in use. Storage capacities are:

- Reservoir #3 - 671m³ (148,000 Imp. gal.)
- Reservoir #5 - 4300 m³ (950,000 Imp. gal).

3.0 Distribution System

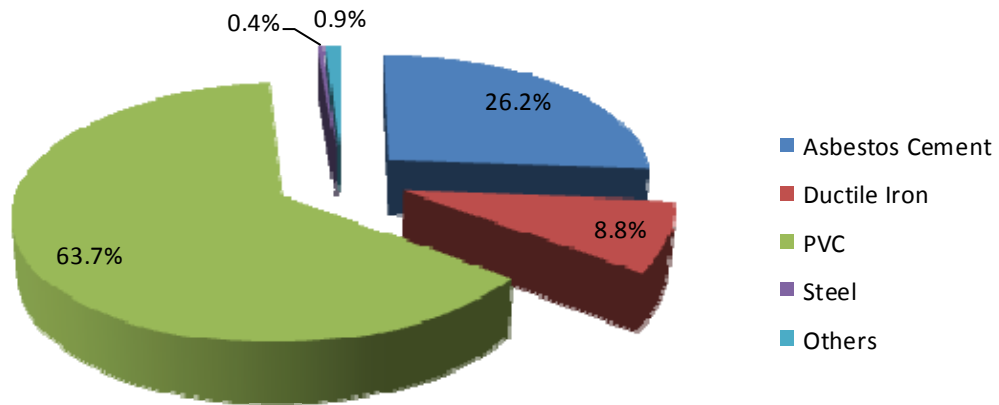
The distribution system consists of 65.6 km of PVC pipe, 9.1 km of Ductile Iron pipe and 27 km of AC (Asbestos Cement) pipe. Sizes range from 100mm (4") to 400mm (16"). There are 581 fire hydrants and one Pressure Reducing Valve (PRV).

Like all municipalities, the infrastructure is aging and watermains are being replaced through capital improvements and development. The following shows the size, age and material of the mains in the Parksville Water System in 2017. Some of these pipes have been replaced over the past year but newer data has not yet been updated by the engineering department.



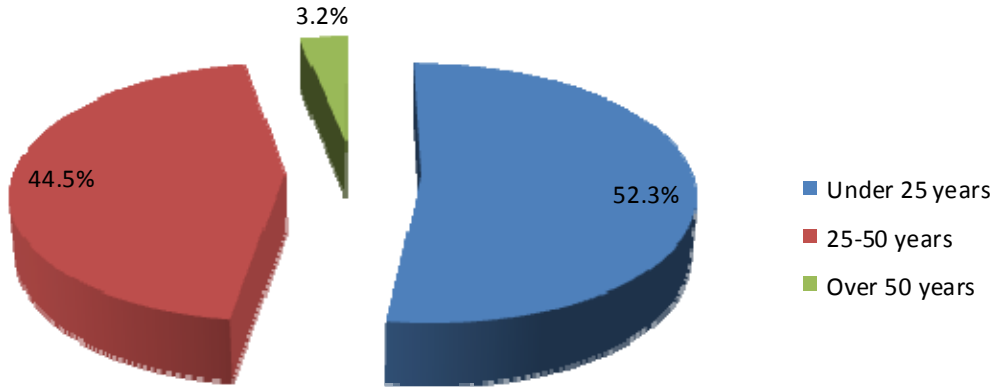
2017 Watermain Diameter Proportions				
Diameter	No Pipes	Distance (km)	Percentage	Type
150 mm or less	147	42.3	41%	Distribution Mains 66.5%
200 mm	510	26.3	25.5%	
250 mm	262	16	15.5%	Supply Mains 33.5%
300 mm	200	11.1	10.8%	
350 mm and greater	109	7.4	7.2%	
Total:	1228	=	103,088.4 km	

2017 Watermain Material Proportions



2017 Watermain Material Proportions		
Material Types	Distance (km)	Percentage
Asbestos Cement	27.0	26.2%
Ductile Iron	9.09	8.82%
PVC	65.62	63.66%
Steel	0.45	0.43%
Others	0.89	0.89%
Total:	103.08	km

2017 Watermain Age Proportions



2017 Watermain Age Proportions			
Age	No Pipes	Distance (km)	Percentage
Under 25 Years (≥ 1992)	1052	53.5	52.3%
25 - 50 Years (1967 - 1992)	641	44.5	44.5%
Over 50 Years (< 1967)	50	3.3	3.2%
Total:	1743	102.3	km

3.1 *Pressure Zones*

The City is divided into two pressure zones. A low pressure and a high pressure. The low pressure is a gravity fed system based on the elevation of Reservoir #4 and Reservoir #5. A top water level of 73.74m above sea level (geodetic) gives a range of 55 psi to 85 psi throughout the system, depending on the geographic location.

The high pressure system was initially developed for higher elevation regions of the City that didn't have sufficient pressures or flows to meet firefighting flows. This high pressure zone has been expanded to areas furthest from the pump stations that lose pressure and flow due to line losses. In order to maintain a balance between high and low pressures but still keep a safe pressure in the lower areas, a PRV was installed to drop the pressure from 80psi to 60psi.

The high pressure water in this zone is supplied from four pumps, a 15 hp, 2-40 hp and a 100 hp. These pumps are controlled through the SCADA system that automatically watches flows and switches on however many pumps it needs to meet the flow requirements.

See **Appendix C** for Map of Pressure Zone Boundaries.



Springwood Pump Station

5.0 Water Sampling and Testing

5.1 Bacteriological

As required by the Island Health, City staff take weekly bacteriological samples to be tested for Total Coliforms and e-Coli Bacteria. There are 17 dedicated sampling sites throughout the City.

See **Appendix D** for 2017 test results (L1 means Less than 1 - no detectable bacteria - Acceptable).

5.2 Full Spectrum Analysis

In addition to weekly sampling throughout the distribution system, the City also sent samples for a full spectrum analysis, three times in 2017. As seen in Appendix E, parameters such as metals (iron, manganese) conventional parameters (pH, Turbidity, Hardness) and disinfection byproducts (Trihalomethane) are tested.

The source water is aesthetically acceptable as set by the "Guidelines for Canadian Drinking Water Summary Table". Aesthetic qualities apply to certain substances or characteristics such as high Iron content which will stain fixtures red or Manganese which will stain black.

Hardness in the water comes from calcium carbonate (CaCO_3). The river water is considered "Soft" under the guidelines and the well water is "Moderate". Hardness levels above 500 mg/l are normally considered unacceptable.

All parameters meet the Canadian Drinking Water Guidelines.

See **Appendix E** for the 2016 Full Spectrum Analysis of the Parksville Water System Source Water. Note: the water tested is in it's raw form before any type of treatment.

5.3 Trihalomethane Analyses

The City also take Trihalomethanes (THMs) samples four times per year. THMs are disinfection by-products that form when chlorine is added to water that contains elevated levels of natural organic matter.

See **Appendix F** for the Trihalomethane results.



1116 Herring Gull
Way sampling site

6.0 *Water Quality Complaints and Incidents*

The operations department had few water quality complaints throughout 2017. During watermain flushing and fire hydrant maintenance there were a few calls related to “brown or dirty” water. City of Parksville crews would either re-flush the mains through a hydrant or flush out at a location closest to the dead end or advise the homeowner that running an outside tap for a few minutes would clear up the problem.

There were a couple of complaints about the taste of chlorine in the water. Chlorine residuals are tested weekly throughout the system and are kept at a safe level. Besides recommending a filter to remove the chlorine within the home, not much can be done about it.

There were a few hardness related complaints mostly contributed to new homeowners from other municipalities who are used to different water composition. There were also a few calls concerning build up in washing machines and toilet bowls although the water is only considered “moderately hard” on the hardness scale. This rating drops throughout the summer when the river supply (soft water) is mixed with the well supply.

Many of the complaints in 2017 were related to pressure drop. The cause for most of the pressure drop complaints were from a faulty PRV (responsibility of the homeowner). There was the odd occasion where staff had to flush the line in order to clear debris (from construction) or where the setter needed to be replaced.

Many calls were related to water leaks. Most were regarding leaky services or water meters. There were no main breaks in 2017, but there were a few calls related to frozen water services in January.

Clay Bank at Englishman River



7.0 *Englishman River Water Service*

The Englishman River Water Service is a joint venture between the City of Parksville and the Regional District of Nanaimo, formed to secure a bulk water supply from the Englishman River. This regional partnership supplements existing well supply sources owned and operated by the City of Parksville and Nanoose Bay Peninsula Water Service Area.

Englishman River Water Service joint venture agreement (percentages of interest).

- City of Parksville 74%
- Regional District of Nanaimo 26%

ERWS project

The City of Parksville and the Regional District of Nanaimo (Nanoose Bay Peninsula) are moving forward with an expansion to the drinking water supply which will ensure a safe and secure water system for the community. At this time, the Englishman River Water Service project is about 50% complete in the construction phase and is on time and within identified budget.

Construction of the ERWS project which started in 2017 includes:

- An in-river water supply intake designed and located to consider the needs of the river users and protect aquatic habitat.
- Water treatment plant with a minimum of 16 million litres per day of membrane filtration capacity to comply with new water regulatory treatment standards including UV light and chlorine disinfection.
- Transmission supply mains to the Top Bridge and Springwood reservoirs and the Nanoose Bay Peninsula Water Service area.

To date, project contractors have completed the following:

- Transmission main to Top Bridge Park
- Englishman River watermain crossing
- Shelly creek watermain crossing
- Intake
- Foundation for water treatment plant and pump station

For more information visit
www.arrowsmithwaterservice.ca



englishman river
WATER SERVICE

8.0 Routine Maintenance Program

8.1 Distribution

- Watermains are flushed using a unidirectional flushing program
- Air relief valves are cleaned
- Fire line meters are cleaned
- Fire hydrants are completely disassembled and inspected on a two-year rotation
- Paint and brush out around hydrants as needed
- All irrigation backflow prevention devices tested and repaired if needed

8.2 Wells

- Daily security check of all wells
- Rehabilitation of one to two wells per year
- Pumps and motors replaced as necessary
- Filling chlorine tank on Springwood Well #1 as needed
- Annual water sampling

8.3 River Intake

- Winter maintenance of chlorination system while off line
- Weekly blowing of air lines through intake screens
- Daily checks of pump flows and chlorine levels
- Monthly calibration of turbidity analyzers

8.4 Reservoirs

- Daily security check of tanks and compounds
- Yearly cleaning of Reservoir #1 and 2
- Clean Reservoir #4 and 5 using divers every five years
- Sustaining valves cleaned monthly

8.5 Pump Stations

- Daily checks of pumps and chlorination system
- Security checks of compounds
- Bi-Annual calibration of chlorine analyzers and turbidimeters

9.0 2017 Projects & Improvements

- Started construction of water intake and treatment plant.
- Completed the transmission main on Top Bridge Park, Englishman River crossing, Shelly Creek crossing, and Alberni Highway crossing.
- Completed the water intake.
- Foundations installed for the water treatment plant and the pump station.
- Continued to replace 3/4" water meter.
- Continued to update the water meter route maps.
- Replaced aging watermain at Banks and Forsyth.
- Developments that included watermain replacement—312 Hirst.
- Developments that included new watermain installation - 574, 584, 592, 614 and 624 Island Highway, 705 and 677 Pym Street and Cedar Ridge phase 4 & 5.

10.0 2017 Capital Projects

- Corfield Street upgrade started November 2017.
- Continued to update the unidirectional flushing maps.

11.0 2018 Projects & Improvements

- Continuing to replace aging water mains for better distribution (Moss, Wallis and McKinnon).
- Developments that may have substantial completion in 2018 include 180 Jensen Avenue East, 249 Finholm, 253, 259, 263 and 273 Dogwood, 1250 Arbutus, 440 Island Highway, 272 Island Highway, 151 Despard.
- Complete Corfield Street upgrade.
- Continue working on the cross connection control program.
- Finish updating the unidirectional flushing maps.
- Railway well #1 & Springwood well #5 rehabilitation
- Springwood well #9 well head design.
- Continue with water meter replacement program.



New River Intake

12.0 Cross Connection Control Program

In 2006, the City of Parksville drafted a cross connection control program. Due to shortage of staff, the program was not able to be properly conducted until 2014.

The cross connection program is currently addressing medium and high hazard water use. These include Industrial, Commercial and Institutional (ICI) users. Each ICI user will be assessed as to the potential risk to the water system. Any costs associated with installation, replacement and testing of an approved backflow device will have to be covered by the property owner.



Irrigation cross connection

A tracking program called FAST is used to track devices around the City (both City owned and privately owned devices). Property owners are required to send the annual test to the utilities technician at the City of Parksville.

City staff remains watchful of potential cross connections around the City, and problems are reported to the utilities technician.

13.0 Emergency Response Plan

The City of Parksville has an Emergency Response Plan (ERP) pertaining to the water system. This document outlines the strategies to deal with events such as contamination of water supply, pump failures and turbidity events. This plan was updated in 2015 and a separate ERP exists for the Arrowsmith Dam.



Murky Water from Collapsed Clay Banks

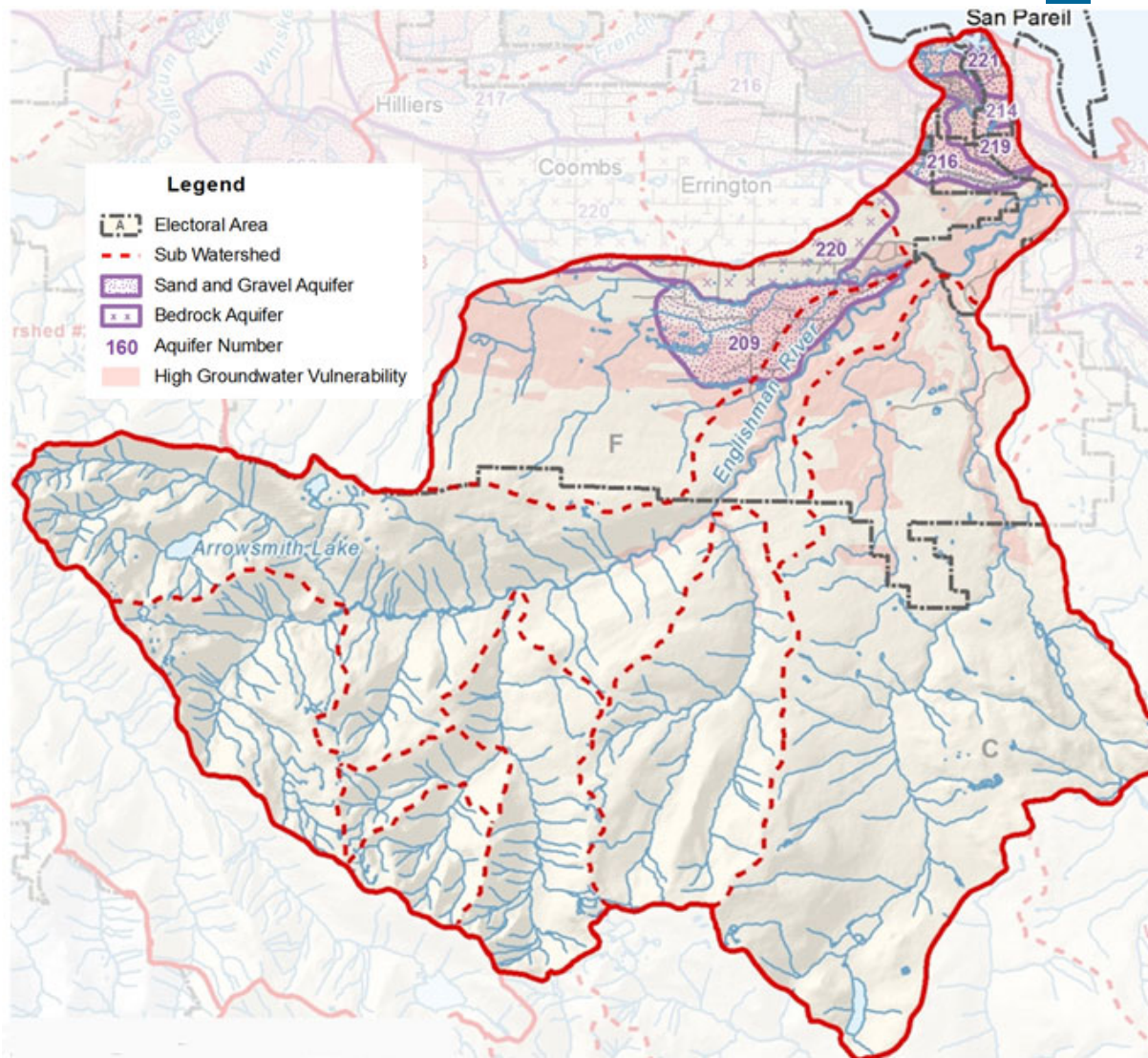
14.0 Watershed Protection Program

The Englishman River flows in an easterly direction from Mount Arrowsmith and discharges into the Strait of Georgia, north of Craig Bay. The highest elevation in the watershed is Mount Arrowsmith, at 1819 metres, and this important watershed has a drainage area of 324 km².

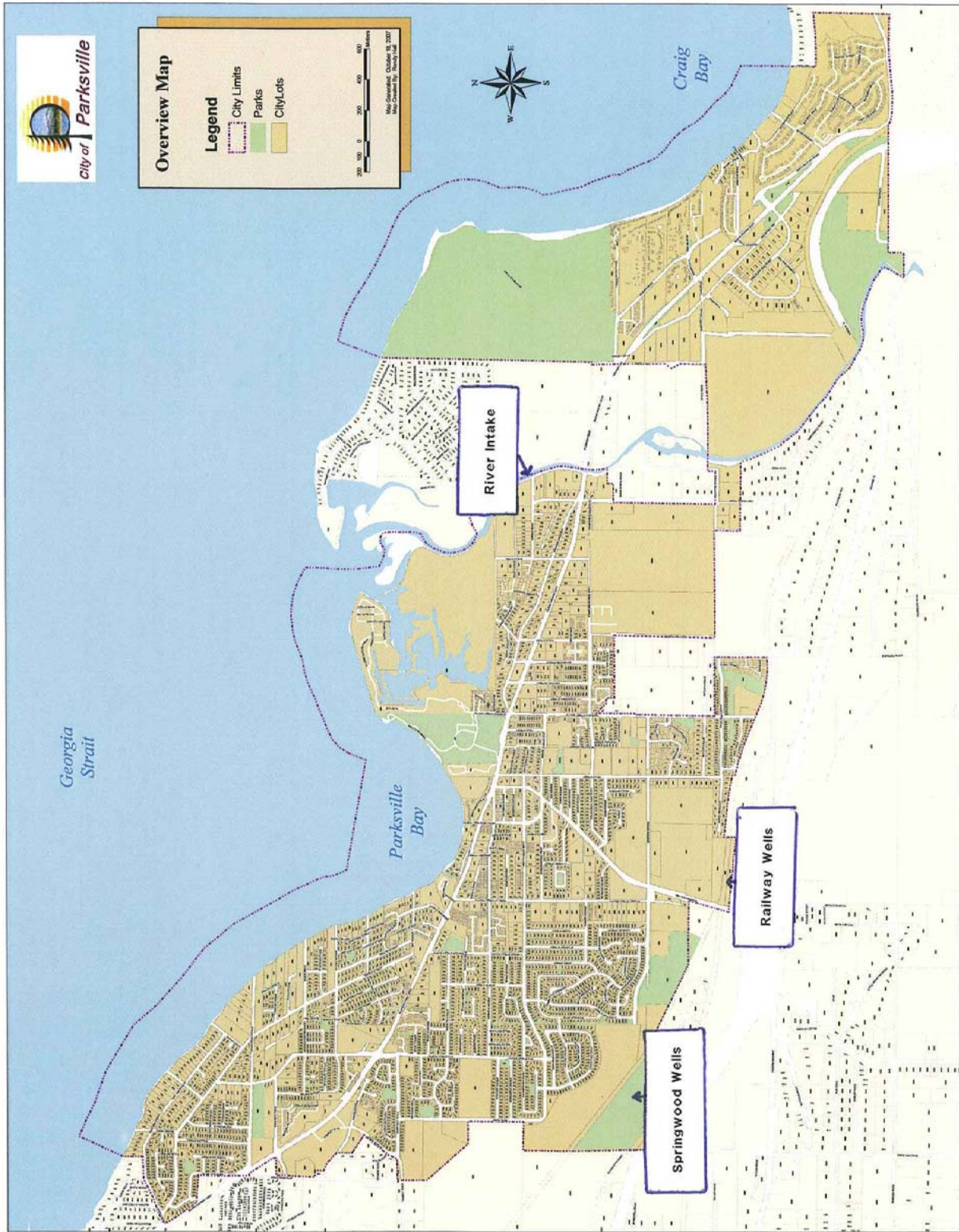
The South Englishman River, Swane Creek, Morison Creek, Shelly Creek and Centre Creek all drain into the Englishman River. The Englishman River is an important fisheries river and through the Arrowsmith Water Service, provides additional summer water supply for the City of Parksville and the Nanoose area. Water is stored behind a dam in Arrowsmith Lake and released as needed. Fish in the Englishman River include Trout, Steelhead and Salmon. The Englishman River is identified as a 'Sensitive Stream' requiring special management attention under the Fisheries Protection Act. This is because of risk to fish populations due to inadequate water flows and other habitat concerns.

Several aquifers in this watershed area are showing signs of stress. Water levels in aquifers 216 and 220 have been dropping over the past several years. This means less water is available for rural residents who rely on wells for drinking water and less water is available in streams for fish. Surface water and groundwater are connected in this watershed, and in the summer when there is no rain, groundwater should be contributing base flow to the local rivers.

Unfortunately, dropping groundwater levels means lower flows in streams, and decreased fish health in the Englishman River and its tributaries.



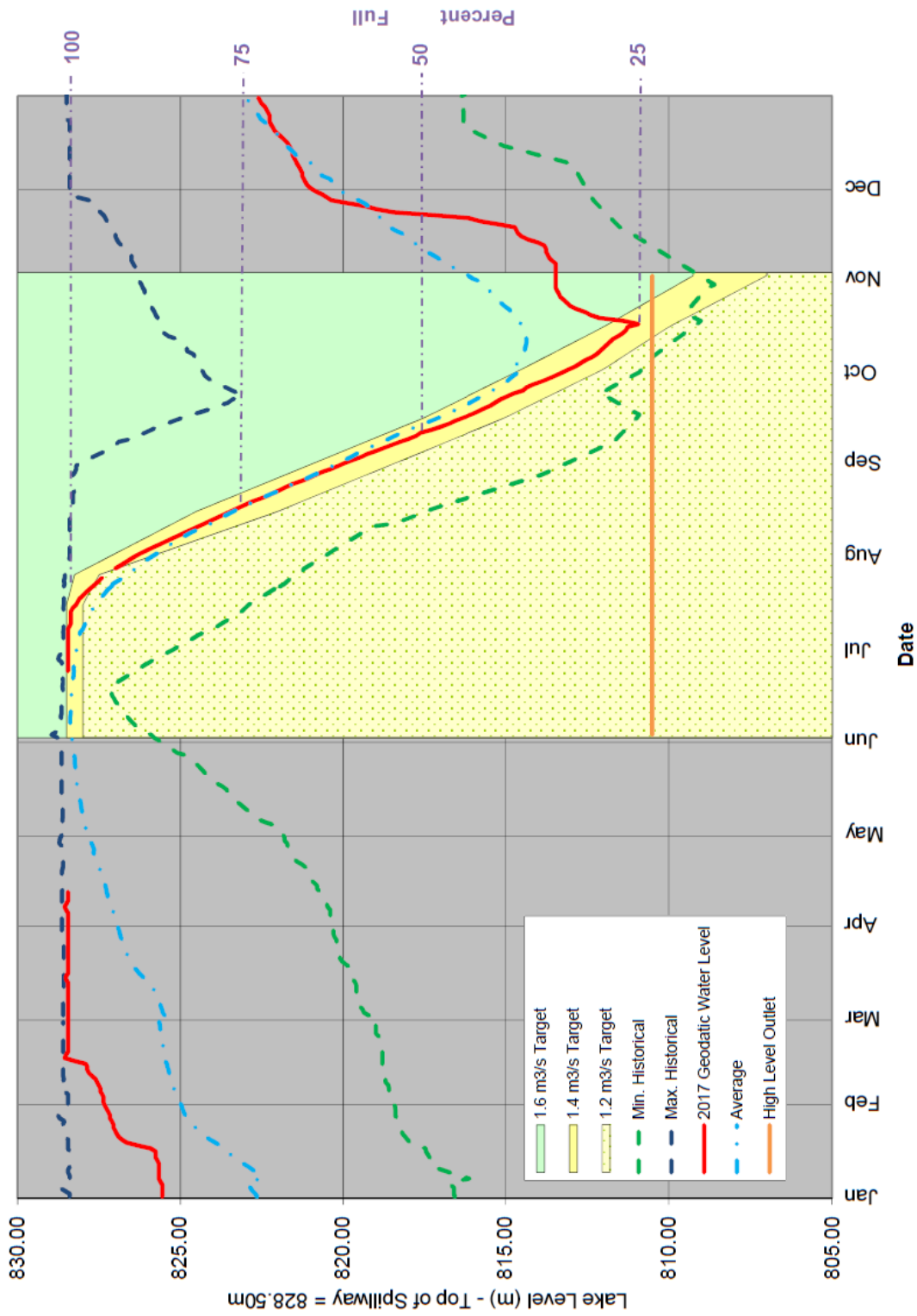
Appendix A



Water Source Locations Map

Appendix B

2017 Arrowsmith Dam Lake Levels
Provisional Operating Rule Curve

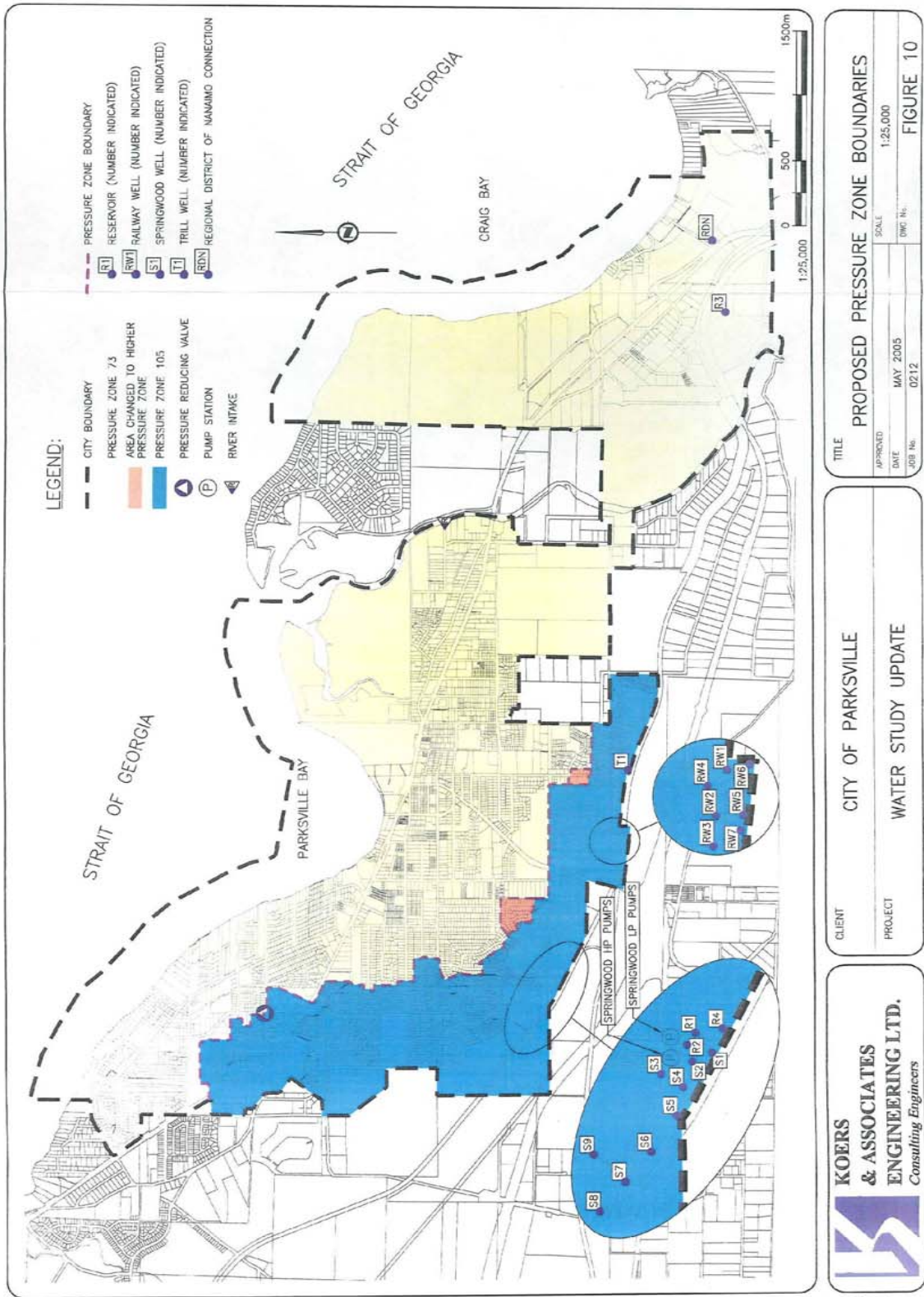


Current as of :2018-01-02

Prepared By: B. Sileniekis

Arrowsmith Dam Lake Levels

Appendix C



TITLE		PROPOSED PRESSURE ZONE BOUNDARIES	
APPROVED	SCALE	1:25,000	
DATE	DATE	MAY 2005	
JOB No.	DRG No.	0212	FIGURE 10

CLIENT	CITY OF PARKSVILLE
PROJECT	WATER STUDY UPDATE

KOERS & ASSOCIATES ENGINEERING LTD.
Consulting Engineers

Map of Pressure Zone Boundaries

Appendix D

PARKSVILLE, WWS

Facility Location:

1116 Herring Gull Way
Parksville

Facility Information:

Facility Type: 301-10000 (DWT)

Facility Sampling History:

<u>Location</u>	<u>Date</u>	<u>Total Coliform</u>	<u>E. Coli</u>
330 Park View, Parksville, 330 Park View, Parksville BC	16-Jan-2018	L1	L1
851 TEMPLE (beside), 851 Temple	16-Jan-2018	L1	L1
Wheeler, Top of Kingsley, 378 Kingsley Street	16-Jan-2018	L1	L1
across from 450 Wisteria, 450 Wisteria	9-Jan-2018	L1	L1
Daffodil at Camas, Parksville, Daffodil at Camas, Parksville BC	9-Jan-2018	L1	L1
River Pump Station, Englishman River Intake	9-Jan-2018	L1	L1
613 Chinook Avenue, Parksville , 613 Chinook Avenue, Parksville BC	2-Jan-2018	L1	L1
Despard & Moilliet, 401 S. Moilliet Street, Parksville BC	2-Jan-2018	L1	L1
Parksville MHP/Utility Building, Parksville, 1247 Arbutus Road, Parksville BC	2-Jan-2018	L1	L1
Top of Corfield, Parksville , Harbour Homes, Parksville BC	2-Jan-2018	L1	L1
136 Memorial, 136 Memorial	19-Dec-2017	L1	L1
271 Chestnut Street, Parksville, 271 Chestnut Street, Parksville BC	19-Dec-2017	L1	L1
770 Soriel , 770 Soriel	19-Dec-2017	L1	L1
across from 450 Wisteria, 450 Wisteria	19-Dec-2017	L1	L1
Community Park, Parksville BC, 193 East Island Highway, Parksville BC	19-Dec-2017	L1	L1
Daffodil at Camas, Parksville, Daffodil at Camas, Parksville BC	19-Dec-2017	L1	L1
Island Highway, by Temple, Island Highway, by Temple	19-Dec-2017	L1	L1
River Pump Station, Englishman River Intake	19-Dec-2017	L1	L1
330 Park View, Parksville, 330 Park View, Parksville BC	12-Dec-2017	L1	L1
851 TEMPLE (beside), 851 Temple	12-Dec-2017	L1	L1
Wheeler, Top of Kingsley, 378 Kingsley Street	12-Dec-2017	L1	L1
Works Yard, Parksville, 1390 Herring Gull Way, Parksville BC	12-Dec-2017	L1	L1
613 Chinook Avenue, Parksville , 613 Chinook Avenue, Parksville BC	5-Dec-2017	L1	L1
Despard & Moilliet, 401 S. Moilliet Street, Parksville BC	5-Dec-2017	L1	L1
Parksville MHP/Utility Building, Parksville, 1247 Arbutus Road, Parksville BC	5-Dec-2017	L1	L1
Top of Corfield, Parksville , Harbour Homes, Parksville BC	5-Dec-2017	L1	L1
136 Memorial, 136 Memorial	28-Nov-2017	L1	L1
across from 450 Wisteria, 450 Wisteria	28-Nov-2017	L1	L1
Island Highway, by Temple, Island Highway, by Temple	28-Nov-2017	L1	L1
Works Yard, Parksville, 1390 Herring Gull Way, Parksville BC	28-Nov-2017	L1	L1
851 TEMPLE (beside), 851 Temple	21-Nov-2017	L1	L1
Community Park, Parksville BC, 193 East Island Highway, Parksville BC	21-Nov-2017	L1	L1
Daffodil at Camas, Parksville, Daffodil at Camas, Parksville BC	21-Nov-2017	L1	L1
Wheeler, Top of Kingsley, 378 Kingsley Street	21-Nov-2017	L1	L1
271 Chestnut Street, Parksville, 271 Chestnut Street, Parksville BC	14-Nov-2017	T	
330 Park View, Parksville, 330 Park View, Parksville BC	14-Nov-2017	T	
770 Soriel , 770 Soriel	14-Nov-2017	T	
River Pump Station, Englishman River Intake	14-Nov-2017	T	

2017 Bacteriological Results

Appendix D

613 Chinook Avenue, Parksville , 613 Chinook Avenue, Parksville BC	7-Nov-2017	L1	L1
Despard & Moilliet, 401 S. Moilliet Street, Parksville BC	7-Nov-2017	L1	L1
Parksville MHP/Utility Building, Parksville, 1247 Arbutus Road, Parksville BC	7-Nov-2017	L1	L1
Top of Corfield, Parksville , Harbour Homes, Parksville BC	7-Nov-2017	L1	L1
Oceanside Health Center, Audit , OHC, Kitchen	6-Nov-2017	L1	L1
136 Memorial, 136 Memorial	1-Nov-2017	L1	L1
Community Park, Parksville BC, 193 East Island Highway, Parksville BC	1-Nov-2017	L1	L1
Island Highway, by Temple, Island Highway, by Temple	1-Nov-2017	L1	L1
330 Park View, Parksville, 330 Park View, Parksville BC	24-Oct-2017	L1	L1
851 TEMPLE (beside), 851 Temple	24-Oct-2017	L1	L1
Daffodil at Camas, Parksville, Daffodil at Camas, Parksville BC	24-Oct-2017	L1	L1
271 Chestnut Street, Parksville, 271 Chestnut Street, Parksville BC	17-Oct-2017	L1	L1
770 Soriel , 770 Soriel	17-Oct-2017	L1	L1
River Pump Station, Englishman River Intake	17-Oct-2017	13.4	L1
across from 450 Wisteria, 450 Wisteria	10-Oct-2017	L1	L1
Wheeler, Top of Kingsley, 378 Kingsley Street	10-Oct-2017	L1	L1
Works Yard, Parksville, 1390 Herring Gull Way, Parksville BC	10-Oct-2017	L1	L1
613 Chinook Avenue, Parksville , 613 Chinook Avenue, Parksville BC	3-Oct-2017	L1	L1
Despard & Moilliet, 401 S. Moilliet Street, Parksville BC	3-Oct-2017	L1	L1
Parksville MHP/Utility Building, Parksville, 1247 Arbutus Road, Parksville BC	3-Oct-2017	L1	L1
Top of Corfield, Parksville , Harbour Homes, Parksville BC	3-Oct-2017	L1	L1
136 Memorial, 136 Memorial	27-Sep-2017	L1	L1
Community Park, Parksville BC, 193 East Island Highway, Parksville BC	27-Sep-2017	L1	L1
Daffodil at Camas, Parksville, Daffodil at Camas, Parksville BC	27-Sep-2017	L1	L1
Island Highway, by Temple, Island Highway, by Temple	27-Sep-2017	L1	L1
271 Chestnut Street, Parksville, 271 Chestnut Street, Parksville BC	19-Sep-2017	L1	L1
770 Soriel , 770 Soriel	19-Sep-2017	L1	L1
851 TEMPLE (beside), 851 Temple	19-Sep-2017	L1	L1
River Pump Station, Englishman River Intake	19-Sep-2017	L1	L1
330 Park View, Parksville, 330 Park View, Parksville BC	11-Sep-2017	L1	L1
across from 450 Wisteria, 450 Wisteria	11-Sep-2017	L1	L1
Wheeler, Top of Kingsley, 378 Kingsley Street	11-Sep-2017	L1	L1
Works Yard, Parksville, 1390 Herring Gull Way, Parksville BC	11-Sep-2017	L1	L1
613 Chinook Avenue, Parksville , 613 Chinook Avenue, Parksville BC	5-Sep-2017	L1	L1
<u>Despard & Moilliet, 401 S. Moilliet Street, Parksville BC.</u>	<u>5-Sep-2017</u>	<u>L1</u>	<u>L1</u>
Parksville MHP/Utility Building, Parksville, 1247 Arbutus Road, Parksville BC	5-Sep-2017	L1	L1
Top of Corfield, Parksville , Harbour Homes, Parksville BC	5-Sep-2017	L1	L1
136 Memorial, 136 Memorial	29-Aug-2017	L1	L1
Community Park, Parksville BC, 193 East Island Highway, Parksville BC	29-Aug-2017	L1	L1
Island Highway, by Temple, Island Highway, by Temple	29-Aug-2017	L1	L1
851 TEMPLE (beside), 851 Temple	22-Aug-2017	L1	L1
Daffodil at Camas, Parksville, Daffodil at Camas, Parksville BC	22-Aug-2017	L1	L1
River Pump Station, Englishman River Intake	22-Aug-2017	L1	L1
across from 450 Wisteria, 450 Wisteria	15-Aug-2017	L1	L1
Wheeler, Top of Kingsley, 378 Kingsley Street	15-Aug-2017	L1	L1
Works Yard, Parksville, 1390 Herring Gull Way, Parksville BC	15-Aug-2017	L1	L1
271 Chestnut Street, Parksville, 271 Chestnut Street, Parksville BC	8-Aug-2017	L1	L1

Appendix D

330 Park View, Parksville, 330 Park View, Parksville BC	8-Aug-2017	L1	L1
770 Soriel , 770 Soriel	8-Aug-2017	L1	L1
613 Chinook Avenue, Parksville , 613 Chinook Avenue, Parksville BC	1-Aug-2017	L1	L1
Parksville MHP/Utility Building, Parksville, 1247 Arbutus Road, Parksville BC	1-Aug-2017	L1	L1
Top of Corfield, Parksville , Harbour Homes, Parksville BC	1-Aug-2017	L1	L1
136 Memorial, 136 Memorial	25-Jul-2017	L1	L1
Community Park, Parksville BC, 193 East Island Highway, Parksville BC	25-Jul-2017	L1	L1
Daffodil at Camas, Parksville, Daffodil at Camas, Parksville BC	25-Jul-2017	L1	L1
Island Highway, by Temple, Island Highway, by Temple	25-Jul-2017	L1	L1
271 Chestnut Street, Parksville, 271 Chestnut Street, Parksville BC	18-Jul-2017	L1	L1
770 Soriel , 770 Soriel	18-Jul-2017	L1	L1
across from 450 Wisteria, 450 Wisteria	18-Jul-2017	L1	L1
River Pump Station, Englishman River Intake	18-Jul-2017	L1	L1
330 Park View, Parksville, 330 Park View, Parksville BC	11-Jul-2017	L1	L1
851 TEMPLE (beside), 851 Temple	11-Jul-2017	L1	L1
Wheeler, Top of Kingsley, 378 Kingsley Street	11-Jul-2017	L1	L1
Works Yard, Parksville, 1390 Herring Gull Way, Parksville BC	11-Jul-2017	L1	L1
613 Chinook Avenue, Parksville , 613 Chinook Avenue, Parksville BC	4-Jul-2017	L1	L1
Despard & Moilliet, 401 S. Moilliet Street, Parksville BC	4-Jul-2017	L1	L1
Parksville MHP/Utility Building, Parksville, 1247 Arbutus Road, Parksville BC	4-Jul-2017	L1	L1
Top of Corfield, Parksville , Harbour Homes, Parksville BC	4-Jul-2017	1	L1
136 Memorial, 136 Memorial	27-Jun-2017	L1	L1
Community Park, Parksville BC, 193 East Island Highway, Parksville BC	27-Jun-2017	L1	L1
Daffodil at Camas, Parksville, Daffodil at Camas, Parksville BC	27-Jun-2017	L1	L1
Island Highway, by Temple, Island Highway, by Temple	27-Jun-2017	L1	L1
271 Chestnut Street, Parksville, 271 Chestnut Street, Parksville BC	20-Jun-2017	L1	L1
770 Soriel , 770 Soriel	20-Jun-2017	L1	L1
across from 450 Wisteria, 450 Wisteria	20-Jun-2017	L1	L1
River Pump Station, Englishman River Intake	20-Jun-2017	L1	L1
330 Park View, Parksville, 330 Park View, Parksville BC	13-Jun-2017	L1	L1
851 TEMPLE (beside), 851 Temple	13-Jun-2017	L1	L1
Wheeler, Top of Kingsley, 378 Kingsley Street	13-Jun-2017	L1	L1
Works Yard, Parksville, 1390 Herring Gull Way, Parksville BC	13-Jun-2017	L1	L1
613 Chinook Avenue, Parksville , 613 Chinook Avenue, Parksville BC	6-Jun-2017	L1	L1
Despard & Moilliet, 401 S. Moilliet Street, Parksville BC	6-Jun-2017	L1	L1
Parksville MHP/Utility Building, Parksville, 1247 Arbutus Road, Parksville BC	6-Jun-2017	L1	L1
Top of Corfield, Parksville , Harbour Homes, Parksville BC	6-Jun-2017	L1	L1
136 Memorial, 136 Memorial	30-May-2017	L1	L1
Island Highway, by Temple, Island Highway, by Temple	30-May-2017	L1	L1
River Pump Station, Englishman River Intake	30-May-2017	L1	L1
851 TEMPLE (beside), 851 Temple	23-May-2017	L1	L1
Community Park, Parksville BC, 193 East Island Highway, Parksville BC	23-May-2017	L1	L1
Daffodil at Camas, Parksville, Daffodil at Camas, Parksville BC	23-May-2017	L1	L1
271 Chestnut Street, Parksville, 271 Chestnut Street, Parksville BC	16-May-2017	L1	L1
330 Park View, Parksville, 330 Park View, Parksville BC	16-May-2017	L1	L1
770 Soriel , 770 Soriel	16-May-2017	L1	L1
across from 450 Wisteria, 450 Wisteria	10-May-2017	L1	L1

2017 Bacteriological Results

Appendix D

Wheeler, Top of Kingsley, 378 Kingsley Street	10-May-2017	L1	L1
Works Yard, Parksville, 1390 Herring Gull Way, Parksville BC	10-May-2017	L1	L1
613 Chinook Avenue, Parksville , 613 Chinook Avenue, Parksville BC	2-May-2017	L1	L1
Despard & Moilliet, 401 S. Moilliet Street, Parksville BC	2-May-2017	L1	L1
Parksville MHP/Utility Building, Parksville, 1247 Arbutus Road, Parksville BC	2-May-2017	L1	L1
Top of Corfield, Parksville , Harbour Homes, Parksville BC	2-May-2017	L1	L1
136 Memorial, 136 Memorial	26-Apr-2017	L1	L1
770 Soriel , 770 Soriel	26-Apr-2017	L1	L1
Community Park, Parksville BC, 193 East Island Highway, Parksville BC	26-Apr-2017	L1	L1
Island Highway, by Temple, Island Highway, by Temple	26-Apr-2017	L1	L1
271 Chestnut Street, Parksville, 271 Chestnut Street, Parksville BC	19-Apr-2017	L1	L1
across from 450 Wisteria, 450 Wisteria	19-Apr-2017	L1	L1
Daffodil at Camas, Parksville, Daffodil at Camas, Parksville BC	19-Apr-2017	L1	L1
River Pump Station, Englishman River Intake	19-Apr-2017	L1	L1
330 Park View, Parksville, 330 Park View, Parksville BC	11-Apr-2017	L1	L1
851 TEMPLE (beside), 851 Temple	11-Apr-2017	L1	L1
Wheeler, Top of Kingsley, 378 Kingsley Street	11-Apr-2017	L1	L1
Works Yard, Parksville, 1390 Herring Gull Way, Parksville BC	11-Apr-2017	L1	L1
613 Chinook Avenue, Parksville , 613 Chinook Avenue, Parksville BC	4-Apr-2017	L1	L1
Despard & Moilliet, 401 S. Moilliet Street, Parksville BC	4-Apr-2017	L1	L1
Parksville MHP/Utility Building, Parksville, 1247 Arbutus Road, Parksville BC	4-Apr-2017	L1	L1
Top of Corfield, Parksville , Harbour Homes, Parksville BC	4-Apr-2017	L1	L1
136 Memorial, 136 Memorial	28-Mar-2017	L1	L1
770 Soriel , 770 Soriel	28-Mar-2017	L1	L1
Community Park, Parksville BC, 193 East Island Highway, Parksville BC	28-Mar-2017	L1	L1
Island Highway, by Temple, Island Highway, by Temple	28-Mar-2017	L1	L1
271 Chestnut Street, Parksville, 271 Chestnut Street, Parksville BC	21-Mar-2017	L1	L1
across from 450 Wisteria, 450 Wisteria	21-Mar-2017	L1	L1
Daffodil at Camas, Parksville, Daffodil at Camas, Parksville BC	21-Mar-2017	L1	L1
River Pump Station, Englishman River Intake	21-Mar-2017	L1	L1
330 Park View, Parksville, 330 Park View, Parksville BC	14-Mar-2017	L1	L1
851 TEMPLE (beside), 851 Temple	14-Mar-2017	L1	L1
Wheeler, Top of Kingsley, 378 Kingsley Street	14-Mar-2017	L1	L1
Works Yard, Parksville, 1390 Herring Gull Way, Parksville BC	14-Mar-2017	L1	L1
613 Chinook Avenue, Parksville , 613 Chinook Avenue, Parksville BC	7-Mar-2017	L1	L1
Despard & Moilliet, 401 S. Moilliet Street, Parksville BC	7-Mar-2017	L1	L1
Parksville MHP/Utility Building, Parksville, 1247 Arbutus Road, Parksville BC	7-Mar-2017	L1	L1
Top of Corfield, Parksville , Harbour Homes, Parksville BC	7-Mar-2017	L1	L1
770 Soriel , 770 Soriel	28-Feb-2017	L1	L1
Community Park, Parksville BC, 193 East Island Highway, Parksville BC	28-Feb-2017	L1	L1
Daffodil at Camas, Parksville, Daffodil at Camas, Parksville BC	28-Feb-2017	L1	L1
Island Highway, by Temple, Island Highway, by Temple	28-Feb-2017	L1	L1
271 Chestnut Street, Parksville, 271 Chestnut Street, Parksville BC	22-Feb-2017	L1	L1
across from 450 Wisteria, 450 Wisteria	22-Feb-2017	L1	L1
River Pump Station, Englishman River Intake	22-Feb-2017	L1	L1
Wheeler, Top of Kingsley, 378 Kingsley Street	22-Feb-2017	L1	L1
136 Memorial, 136 Memorial	14-Feb-2017	L1	L1
330 Park View, Parksville, 330 Park View, Parksville BC	14-Feb-2017	L1	L1

2017 Bacteriological Results

Appendix D

851 TEMPLE (beside), 851 Temple	14-Feb-2017	L1	L1
Works Yard, Parksville, 1390 Herring Gull Way, Parksville BC	14-Feb-2017	L1	L1
613 Chinook Avenue, Parksville , 613 Chinook Avenue, Parksville BC	7-Feb-2017	L1	L1
Despard & Moilliet, 401 S. Moilliet Street, Parksville BC	7-Feb-2017	L1	L1
Parksville MHP/Utility Building, Parksville, 1247 Arbutus Road, Parksville BC	7-Feb-2017	L1	L1
Top of Corfield, Parksville , Harbour Homes, Parksville BC	7-Feb-2017	L1	L1
across from 450 Wisteria, 450 Wisteria	31-Jan-2017	L1	L1
Daffodil at Camas, Parksville, Daffodil at Camas, Parksville BC	31-Jan-2017	L1	L1
River Pump Station, Englishman River Intake	31-Jan-2017	L1	L1
330 Park View, Parksville, 330 Park View, Parksville BC	24-Jan-2017	L1	L1
770 Soriel , 770 Soriel	24-Jan-2017	L1	L1
Island Highway, by Temple, Island Highway, by Temple	24-Jan-2017	L1	L1
136 Memorial, 136 Memorial	17-Jan-2017	L1	L1
271 Chestnut Street, Parksville, 271 Chestnut Street, Parksville BC	17-Jan-2017	L1	L1
Community Park, Parksville BC, 193 East Island Highway, Parksville BC	17-Jan-2017	L1	L1
851 TEMPLE (beside), 851 Temple	10-Jan-2017	L1	L1
Wheeler, Top of Kingsley, 378 Kingsley Street	10-Jan-2017	L1	L1
Works Yard, Parksville, 1390 Herring Gull Way, Parksville BC	10-Jan-2017	L1	L1
613 Chinook Avenue, Parksville , 613 Chinook Avenue, Parksville BC	3-Jan-2017	L1	L1
Despard & Moilliet, 401 S. Moilliet Street, Parksville BC	3-Jan-2017	L1	L1
Parksville MHP/Utility Building, Parksville, 1247 Arbutus Road, Parksville BC	3-Jan-2017	L1	L1
Top of Corfield, Parksville , Harbour Homes, Parksville BC	3-Jan-2017	L1	L1

Information taken from: http://www.viha.ca/mho/water/water_sampling_results.htm

Appendix E



CERTIFICATE OF ANALYSIS

REPORTED TO	Parksville, City of P O Box 1390, 100 Jensen Avenue East Parksville, BC V9P 2H3	TEL	(250) 951-2489
		FAX	
ATTENTION	Barbara Silenieks	WORK ORDER	7061084
PO NUMBER	002637	RECEIVED / TEMP	2017-06-13 09:15 / 8°C
PROJECT	Drinking Water Pkg	REPORTED	2017-06-20
PROJECT INFO			

General Comments:

CARO Analytical Services employs methods which are conducted according to procedures accepted by appropriate regulatory agencies, and/or are conducted in accordance with recognized professional standards using accepted testing methodologies and quality control efforts, except where otherwise agreed to by the client.

The results in this report apply to the samples analyzed in accordance with the Chain of Custody or Sample Requisition document. This analytical report must be reproduced in its entirety. CARO is not responsible for any loss or damage resulting directly or indirectly from error or omission in the conduct of testing. Liability is limited to the cost of analysis. Samples will be disposed of 30 days after the test report has been issued unless otherwise agreed to in writing.

Authorized By: **Jeffery Lopes, B.Sc.**
Account Manager

If you have any questions or concerns, please contact me at jlopes@caro.ca

Locations:

#110 4011 Viking Way
Richmond, BC V6V 2K9
Tel: 604-279-1499

#102 3677 Highway 97N
Kelowna, BC V1X 5C3
Tel: 250-765-9646

17225 109 Avenue
Edmonton, AB T5S 1H7
Tel: 780-489-9100

www.caro.ca

CARO Analytical Services
Rev 2017-01-05

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Full Spectrum Analysis—Well Water

Appendix E



ANALYSIS INFORMATION

REPORTED TO PROJECT Parksville, City of
Drinking Water Pkg

WORK ORDER REPORTED 7061084
2017-06-20

Analysis Description	Method Reference	Technique	Location
Alkalinity in Water	APHA 2320 B*	Titration with H2SO4	Kelowna
Anions by IC in Water	APHA 4110 B	Ion Chromatography with Chemical Suppression of Eluent Conductivity	Kelowna
Coliforms, Total (MF) in Water	APHA 9222	Membrane Filtration	Sublet
Colour, True in Water	APHA 2120 C	Spectrophotometry (456 nm)	Kelowna
Conductivity in Water	APHA 2510 B	Conductivity Meter	Kelowna
Cyanide, SAD in Water	ASTM D7511-12	Flow Injection Analysis with In-Line Ultraviolet Digestion and Amperometric Detection	Kelowna
E. coli (MF) in Water	APHA 9223 B	Enzyme Substrate Endo Agar	Sublet
Hardness (as CaCO3) in Water	APHA 2340 B*	Calculation: 2.497 [total Ca] + 4.118 [total Mg] (Estimated)	N/A
Langelier Index in Water	APHA 2330 B	Calculation	N/A
Mercury, total by CVAFS in Water	EPA 245.7*	BrCl2 Oxidation / Cold Vapor Atomic Fluorescence Spectrometry (CVAFS)	Richmond
pH in Water	APHA 4500-H+ B	Electrometry	Kelowna
Solids, Total Dissolved (calc) in Water	APHA 1030 E	Calculation: 100 x ([Cations]-[Anions])/([Cations]+[Anions])	N/A
Temperature (lab) in Water	APHA 2550 B	Thermometer	Kelowna
Total Metals by ICPMS in Water	APHA 3030 E* / APHA 3125 B	HNO3+HCl Hot Block Digestion / Inductively Coupled Plasma Mass Spectrometry (ICP-MS)	Richmond
Turbidity in Water	APHA 2130 B	Nephelometry	Kelowna

Note: An asterisk in the Method Reference indicates that the CARO method has been modified from the reference method

Method Reference Descriptions:

APHA	Standard Methods for the Examination of Water and Wastewater, 22nd Edition, American Public Health Association/American Water Works Association/Water Environment Federation
ASTM	ASTM International Test Methods
EPA	United States Environmental Protection Agency Test Methods

Glossary of Terms:

MRL	Method Reporting Limit
<	Less than the Reported Detection Limit (RDL) - the RDL may be higher than the MRL due to various factors such as dilutions, limited sample volume, high moisture, or interferences
°C	Degrees Celcius
CFU/100 mL	Colony Forming Units per 100 millilitres
CU	Colour Units (referenced against a platinum cobalt standard)
mg/L	Milligrams per litre
NTU	Nephelometric Turbidity Units
pH units	pH < 7 = acidic, pH > 7 = basic
µS/cm	Microsiemens per centimetre

Appendix E



SAMPLE ANALYTICAL DATA

REPORTED TO PROJECT Parksville, City of Drinking Water Pkg

WORK ORDER REPORTED 7061084 2017-06-20

Analyte	Result / Recovery	Standard / Guideline	MRL / Units	Prepared	Analyzed	Notes
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Sample ID: 760 Ermineskin (7061084-01) [Water] Sampled: 2017-06-12 10:10

<i>Anions</i>						
Chloride	23.5	N/A	0.10 mg/L	N/A	2017-06-15	
Fluoride	< 0.10	N/A	0.10 mg/L	N/A	2017-06-15	
Nitrate (as N)	1.13	N/A	0.010 mg/L	N/A	2017-06-15	
Nitrite (as N)	< 0.010	N/A	0.010 mg/L	N/A	2017-06-15	
Sulfate	7.5	N/A	1.0 mg/L	N/A	2017-06-15	

<i>General Parameters</i>						
Alkalinity, Total (as CaCO3)	125	N/A	2.0 mg/L	N/A	2017-06-14	
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	N/A	2.0 mg/L	N/A	2017-06-14	
Alkalinity, Bicarbonate (as CaCO3)	125	N/A	2.0 mg/L	N/A	2017-06-14	
Alkalinity, Carbonate (as CaCO3)	< 1.0	N/A	2.0 mg/L	N/A	2017-06-14	
Alkalinity, Hydroxide (as CaCO3)	< 1.0	N/A	2.0 mg/L	N/A	2017-06-14	
Colour, True	< 5.0	N/A	5.0 CU	N/A	2017-06-15	
Conductivity (EC)	339	N/A	2.0 µS/cm	N/A	2017-06-14	
Cyanide, Total	< 0.0020	N/A	0.0020 mg/L	N/A	2017-06-15	
pH	7.72	N/A	0.01 pH units	N/A	2017-06-14	HT2
Temperature, at pH	23	N/A	°C	N/A	2017-06-14	HT2
Turbidity	0.13	N/A	0.10 NTU	N/A	2017-06-14	

<i>Calculated Parameters</i>						
Hardness, Total (as CaCO3)	152	N/A	0.500 mg/L	N/A	N/A	
Langelier Index	-0.08	N/A	-5.0 -	N/A	2017-06-20	
Solids, Total Dissolved (calc)	173	N/A	1.00 mg/L	N/A	N/A	

<i>Total Metals</i>						
Aluminum, total	< 0.0050	N/A	0.0050 mg/L	2017-06-14	2017-06-14	
Antimony, total	< 0.00010	N/A	0.00010 mg/L	2017-06-14	2017-06-14	
Arsenic, total	< 0.00050	N/A	0.00050 mg/L	2017-06-14	2017-06-14	
Barium, total	0.0100	N/A	0.0050 mg/L	2017-06-14	2017-06-14	
Boron, total	0.014	N/A	0.004 mg/L	2017-06-14	2017-06-14	
Cadmium, total	< 0.000010	N/A	0.000010 mg/L	2017-06-14	2017-06-14	
Calcium, total	34.6	N/A	0.20 mg/L	2017-06-14	2017-06-14	
Chromium, total	0.00077	N/A	0.00050 mg/L	2017-06-14	2017-06-14	
Cobalt, total	< 0.00010	N/A	0.00010 mg/L	2017-06-14	2017-06-14	
Copper, total	0.0198	N/A	0.00020 mg/L	2017-06-14	2017-06-14	
Iron, total	0.014	N/A	0.010 mg/L	2017-06-14	2017-06-14	
Lead, total	0.00120	N/A	0.00010 mg/L	2017-06-14	2017-06-14	
Magnesium, total	15.9	N/A	0.010 mg/L	2017-06-14	2017-06-14	
Manganese, total	0.00898	N/A	0.00020 mg/L	2017-06-14	2017-06-14	
Mercury, total	< 0.00002	N/A	0.00002 mg/L	2017-06-19	2017-06-19	
Molybdenum, total	< 0.00010	N/A	0.00010 mg/L	2017-06-14	2017-06-14	
Nickel, total	< 0.00020	N/A	0.00020 mg/L	2017-06-14	2017-06-14	
Potassium, total	0.81	N/A	0.02 mg/L	2017-06-14	2017-06-14	
Selenium, total	< 0.00050	N/A	0.00050 mg/L	2017-06-14	2017-06-14	
Sodium, total	9.42	N/A	0.02 mg/L	2017-06-14	2017-06-14	
Uranium, total	0.000228	N/A	0.000020 mg/L	2017-06-14	2017-06-14	
Zinc, total	0.0150	N/A	0.0040 mg/L	2017-06-14	2017-06-14	

Appendix E



SAMPLE ANALYTICAL DATA

REPORTED TO PROJECT Parksville, City of Drinking Water Pkg

WORK ORDER REPORTED 7061084 2017-06-20

Analyte	Result / Recovery	Standard / Guideline	MRL / Units Limits	Prepared	Analyzed	Notes
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Sample ID: 760 Ermineskin (7061084-01) [Water] Sampled: 2017-06-12 10:10, Continued

Microbiological Parameters

Coliforms, Total	<1	N/A	1 CFU/100 mL		2017-06-13	
E. coli	<1	N/A	1 CFU/100 mL		2017-06-13	

Sample ID: 1116 Herring Gull Way (7061084-02) [Water] Sampled: 2017-06-12 09:40

Anions

Chloride	5.70	N/A	0.10 mg/L	N/A	2017-06-15	
Fluoride	< 0.10	N/A	0.10 mg/L	N/A	2017-06-15	
Nitrate (as N)	0.040	N/A	0.010 mg/L	N/A	2017-06-15	
Nitrite (as N)	< 0.010	N/A	0.010 mg/L	N/A	2017-06-15	
Sulfate	1.4	N/A	1.0 mg/L	N/A	2017-06-15	

General Parameters

Alkalinity, Total (as CaCO3)	21.8	N/A	2.0 mg/L	N/A	2017-06-14	
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	N/A	2.0 mg/L	N/A	2017-06-14	
Alkalinity, Bicarbonate (as CaCO3)	21.8	N/A	2.0 mg/L	N/A	2017-06-14	
Alkalinity, Carbonate (as CaCO3)	< 1.0	N/A	2.0 mg/L	N/A	2017-06-14	
Alkalinity, Hydroxide (as CaCO3)	< 1.0	N/A	2.0 mg/L	N/A	2017-06-14	
Colour, True	< 5.0	N/A	5.0 CU	N/A	2017-06-15	
Conductivity (EC)	67.1	N/A	2.0 µS/cm	N/A	2017-06-14	
Cyanide, Total	< 0.0020	N/A	0.0020 mg/L	N/A	2017-06-15	
pH	7.09	N/A	0.01 pH units	N/A	2017-06-14	HT2
Temperature, at pH	23	N/A	°C	N/A	2017-06-14	HT2
Turbidity	0.10	N/A	0.10 NTU	N/A	2017-06-14	

Calculated Parameters

Hardness, Total (as CaCO3)	25.6	N/A	0.500 mg/L	N/A	N/A	
Langelier Index	-2.1	N/A	-5.0 -	N/A	2017-06-20	
Solids, Total Dissolved (calc)	33.2	N/A	1.00 mg/L	N/A	N/A	

Total Metals

Aluminum, total	0.0109	N/A	0.0050 mg/L	2017-06-14	2017-06-14	
Antimony, total	< 0.00010	N/A	0.00010 mg/L	2017-06-14	2017-06-14	
Arsenic, total	< 0.00050	N/A	0.00050 mg/L	2017-06-14	2017-06-14	
Barium, total	0.0056	N/A	0.0050 mg/L	2017-06-14	2017-06-14	
Boron, total	0.012	N/A	0.004 mg/L	2017-06-14	2017-06-14	
Cadmium, total	< 0.000010	N/A	0.000010 mg/L	2017-06-14	2017-06-14	
Calcium, total	8.47	N/A	0.20 mg/L	2017-06-14	2017-06-14	
Chromium, total	< 0.00050	N/A	0.00050 mg/L	2017-06-14	2017-06-14	
Cobalt, total	< 0.00010	N/A	0.00010 mg/L	2017-06-14	2017-06-14	
Copper, total	0.0171	N/A	0.00020 mg/L	2017-06-14	2017-06-14	
Iron, total	0.012	N/A	0.010 mg/L	2017-06-14	2017-06-14	
Lead, total	0.00061	N/A	0.00010 mg/L	2017-06-14	2017-06-14	
Magnesium, total	1.09	N/A	0.010 mg/L	2017-06-14	2017-06-14	
Manganese, total	< 0.00020	N/A	0.00020 mg/L	2017-06-14	2017-06-14	
Mercury, total	< 0.00002	N/A	0.00002 mg/L	2017-06-19	2017-06-19	
Molybdenum, total	< 0.00010	N/A	0.00010 mg/L	2017-06-14	2017-06-14	

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Rev 2017-01-05

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Full Spectrum Analysis—Well Water

Appendix E



SAMPLE ANALYTICAL DATA

REPORTED TO PROJECT Parksville, City of
Drinking Water Pkg

WORK ORDER 7061084
REPORTED 2017-06-20

Analyte	Result / Recovery	Standard / Guideline	MRL / Units Limits	Prepared	Analyzed	Notes
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Sample ID: 1116 Herring Gull Way (7061084-02) [Water] Sampled: 2017-06-12 09:40, Continued

Total Metals, Continued

Nickel, total	< 0.00020	N/A	0.00020 mg/L	2017-06-14	2017-06-14	
Potassium, total	0.14	N/A	0.02 mg/L	2017-06-14	2017-06-14	
Selenium, total	< 0.00050	N/A	0.00050 mg/L	2017-06-14	2017-06-14	
Sodium, total	2.95	N/A	0.02 mg/L	2017-06-14	2017-06-14	
Uranium, total	< 0.000020	N/A	0.000020 mg/L	2017-06-14	2017-06-14	
Zinc, total	0.0083	N/A	0.0040 mg/L	2017-06-14	2017-06-14	

Microbiological Parameters

Coliforms, Total	<1	N/A	1 CFU/100 mL		2017-06-13	
E. coli	<1	N/A	1 CFU/100 mL		2017-06-13	

Sample / Analysis Qualifiers:

HT2 The 15 minute recommended holding time (from sampling to analysis) has been exceeded - field analysis is recommended.

Appendix E



CERTIFICATE OF ANALYSIS

REPORTED TO	Parksville, City of P O Box 1390, 100 Jensen Avenue East Parksville, BC V9P 2H3	TEL	(250) 951-2489
ATTENTION	Barbara Silenieks	FAX	
PO NUMBER	002775	WORK ORDER	7101356
PROJECT	Drinking Water Pkg	RECEIVED / TEMP	2017-10-17 09:00 / 7°C
PROJECT INFO		REPORTED	2017-10-26
		COC NUMBER	B53067

General Comments:

CARO Analytical Services employs methods which are conducted according to procedures accepted by appropriate regulatory agencies, and/or are conducted in accordance with recognized professional standards using accepted testing methodologies and quality control efforts, except where otherwise agreed to by the client.

The results in this report apply to the samples analyzed in accordance with the Chain of Custody or Sample Requisition document. This analytical report must be reproduced in its entirety. CARO is not responsible for any loss or damage resulting directly or indirectly from error or omission in the conduct of testing. Liability is limited to the cost of analysis. Samples will be disposed of 30 days after the test report has been issued unless otherwise agreed to in writing.

Authorized By:

Helen Maleki, Dipl T
Client Service Representative

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CARO Analytical Services
Rev 2017-10-03

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Full Spectrum Analysis—Well Water

Appendix E



SAMPLE ANALYTICAL DATA

REPORTED TO PROJECT Parksville, City of Drinking Water Pkg

WORK ORDER REPORTED 7101356
2017-10-26

Analyte	Result / Recovery	Standard / Guideline	MRL / Units Limits	Prepared	Analyzed	Notes
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Sample ID: Spring, well #1 (7101356-01) [Water] Sampled: 2017-10-16 13:00

Anions

Chloride	18.4	N/A	0.10 mg/L	N/A	2017-10-18	
Fluoride	< 0.10	N/A	0.10 mg/L	N/A	2017-10-18	
Nitrate (as N)	1.41	N/A	0.010 mg/L	N/A	2017-10-18	
Nitrite (as N)	< 0.010	N/A	0.010 mg/L	N/A	2017-10-18	
Sulfate	4.5	N/A	1.0 mg/L	N/A	2017-10-18	

General Parameters

Alkalinity, Total (as CaCO3)	101	N/A	1.0 mg/L	N/A	2017-10-18	
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	N/A	1.0 mg/L	N/A	2017-10-18	
Alkalinity, Bicarbonate (as CaCO3)	101	N/A	1.0 mg/L	N/A	2017-10-18	
Alkalinity, Carbonate (as CaCO3)	< 1.0	N/A	1.0 mg/L	N/A	2017-10-18	
Alkalinity, Hydroxide (as CaCO3)	< 1.0	N/A	1.0 mg/L	N/A	2017-10-18	
Colour, True	< 5.0	N/A	5.0 CU	N/A	2017-10-19	
Conductivity (EC)	260	N/A	2.0 µS/cm	N/A	2017-10-18	
Cyanide, Total	< 0.0020	N/A	0.0020 mg/L	N/A	2017-10-20	
pH	7.19	N/A	0.10 pH units	N/A	2017-10-18	HT2
Temperature, at pH	22	N/A	°C	N/A	2017-10-18	HT2
Turbidity	< 0.10	N/A	0.10 NTU	N/A	2017-10-19	

Calculated Parameters

Hardness, Total (as CaCO3)	115	N/A	0.500 mg/L	N/A	N/A	
Langelier Index	-0.8	N/A	-5.0 -	N/A	2017-10-26	
Solids, Total Dissolved (calc)	137	N/A	1.00 mg/L	N/A	N/A	

Total Metals

Aluminum, total	< 0.0050	N/A	0.0050 mg/L	2017-10-23	2017-10-24	
Antimony, total	< 0.00020	N/A	0.00020 mg/L	2017-10-23	2017-10-24	
Arsenic, total	< 0.00050	N/A	0.00050 mg/L	2017-10-23	2017-10-24	
Barium, total	< 0.0050	N/A	0.0050 mg/L	2017-10-23	2017-10-24	
Boron, total	0.0130	N/A	0.0050 mg/L	2017-10-23	2017-10-24	
Cadmium, total	< 0.000010	N/A	0.000010 mg/L	2017-10-23	2017-10-24	
Calcium, total	25.4	N/A	0.20 mg/L	2017-10-23	2017-10-24	
Chromium, total	< 0.00050	N/A	0.00050 mg/L	2017-10-23	2017-10-24	
Cobalt, total	< 0.00010	N/A	0.00010 mg/L	2017-10-23	2017-10-24	
Copper, total	0.00108	N/A	0.00040 mg/L	2017-10-23	2017-10-24	
Iron, total	< 0.010	N/A	0.010 mg/L	2017-10-23	2017-10-24	
Lead, total	< 0.00020	N/A	0.00020 mg/L	2017-10-23	2017-10-24	
Magnesium, total	12.6	N/A	0.010 mg/L	2017-10-23	2017-10-24	
Manganese, total	0.0154	N/A	0.00020 mg/L	2017-10-23	2017-10-24	
Mercury, total	< 0.000010	N/A	0.000010 mg/L	2017-10-23	2017-10-24	
Molybdenum, total	0.00011	N/A	0.00010 mg/L	2017-10-23	2017-10-24	
Nickel, total	< 0.00040	N/A	0.00040 mg/L	2017-10-23	2017-10-24	
Potassium, total	0.52	N/A	0.10 mg/L	2017-10-23	2017-10-24	
Selenium, total	< 0.00050	N/A	0.00050 mg/L	2017-10-23	2017-10-24	
Sodium, total	7.57	N/A	0.10 mg/L	2017-10-23	2017-10-24	
Strontium, total	0.0763	N/A	0.0010 mg/L	2017-10-23	2017-10-24	
Uranium, total	0.000074	N/A	0.000020 mg/L	2017-10-23	2017-10-24	

Full Spectrum Analysis—Well Water

Appendix E



SAMPLE ANALYTICAL DATA

REPORTED TO PROJECT Parksville, City of Drinking Water Pkg

WORK ORDER REPORTED 7101356 2017-10-26

Analyte	Result / Recovery	Standard / Guideline	MRL / Units Limits	Prepared	Analyzed	Notes
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Sample ID: Spring, well #1 (7101356-01) [Water] Sampled: 2017-10-16 13:00, Continued

Total Metals, Continued

Zinc, total	< 0.0040	N/A	0.0040 mg/L	2017-10-23	2017-10-24	
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Sample ID: Spring, well #8 (7101356-02) [Water] Sampled: 2017-10-16 13:10

Anions

Chloride	16.6	N/A	0.10 mg/L	N/A	2017-10-18	
Fluoride	< 0.10	N/A	0.10 mg/L	N/A	2017-10-18	
Nitrate (as N)	1.02	N/A	0.010 mg/L	N/A	2017-10-18	
Nitrite (as N)	< 0.010	N/A	0.010 mg/L	N/A	2017-10-18	
Sulfate	6.7	N/A	1.0 mg/L	N/A	2017-10-18	

General Parameters

Alkalinity, Total (as CaCO3)	143	N/A	1.0 mg/L	N/A	2017-10-18	
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	N/A	1.0 mg/L	N/A	2017-10-18	
Alkalinity, Bicarbonate (as CaCO3)	143	N/A	1.0 mg/L	N/A	2017-10-18	
Alkalinity, Carbonate (as CaCO3)	< 1.0	N/A	1.0 mg/L	N/A	2017-10-18	
Alkalinity, Hydroxide (as CaCO3)	< 1.0	N/A	1.0 mg/L	N/A	2017-10-18	
Colour, True	< 5.0	N/A	5.0 CU	N/A	2017-10-19	
Conductivity (EC)	330	N/A	2.0 µS/cm	N/A	2017-10-18	
Cyanide, Total	< 0.0020	N/A	0.0020 mg/L	N/A	2017-10-20	
pH	7.56	N/A	0.10 pH units	N/A	2017-10-18	HT2
Temperature, at pH	22	N/A	°C	N/A	2017-10-18	HT2
Turbidity	0.39	N/A	0.10 NTU	N/A	2017-10-19	

Calculated Parameters

Hardness, Total (as CaCO3)	151	N/A	0.500 mg/L	N/A	N/A	
Langelier Index	-0.2	N/A	-5.0 -	N/A	2017-10-26	
Solids, Total Dissolved (calc)	173	N/A	1.00 mg/L	N/A	N/A	

Total Metals

Aluminum, total	< 0.0050	N/A	0.0050 mg/L	2017-10-23	2017-10-24	
Antimony, total	< 0.00020	N/A	0.00020 mg/L	2017-10-23	2017-10-24	
Arsenic, total	< 0.00050	N/A	0.00050 mg/L	2017-10-23	2017-10-24	
Barium, total	0.0073	N/A	0.0050 mg/L	2017-10-23	2017-10-24	
Boron, total	0.0136	N/A	0.0050 mg/L	2017-10-23	2017-10-24	
Cadmium, total	< 0.000010	N/A	0.000010 mg/L	2017-10-23	2017-10-24	
Calcium, total	33.0	N/A	0.20 mg/L	2017-10-23	2017-10-24	
Chromium, total	0.00117	N/A	0.00050 mg/L	2017-10-23	2017-10-24	
Cobalt, total	< 0.00010	N/A	0.00010 mg/L	2017-10-23	2017-10-24	
Copper, total	0.00214	N/A	0.00040 mg/L	2017-10-23	2017-10-24	
Iron, total	0.074	N/A	0.010 mg/L	2017-10-23	2017-10-24	
Lead, total	0.00037	N/A	0.00020 mg/L	2017-10-23	2017-10-24	
Magnesium, total	16.5	N/A	0.010 mg/L	2017-10-23	2017-10-24	
Manganese, total	0.0123	N/A	0.00020 mg/L	2017-10-23	2017-10-24	
Mercury, total	< 0.000010	N/A	0.000010 mg/L	2017-10-23	2017-10-24	
Molybdenum, total	< 0.00010	N/A	0.00010 mg/L	2017-10-23	2017-10-24	
Nickel, total	< 0.00040	N/A	0.00040 mg/L	2017-10-23	2017-10-24	

Full Spectrum Analysis—Well Water

Appendix E



SAMPLE ANALYTICAL DATA

REPORTED TO PROJECT Parkville, City of
Drinking Water Pkg

WORK ORDER REPORTED 7101356
2017-10-26

Analyte	Result / Recovery	Standard / Guideline	MRL / Units Limits	Prepared	Analyzed	Notes
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Sample ID: Spring. well #8 (7101356-02) [Water] Sampled: 2017-10-16 13:10, Continued

Total Metals, Continued

Potassium, total	0.85	N/A	0.10 mg/L	2017-10-23	2017-10-24	
Selenium, total	< 0.00050	N/A	0.00050 mg/L	2017-10-23	2017-10-24	
Sodium, total	7.65	N/A	0.10 mg/L	2017-10-23	2017-10-24	
Strontium, total	0.0897	N/A	0.0010 mg/L	2017-10-23	2017-10-24	
Uranium, total	0.000251	N/A	0.000020 mg/L	2017-10-23	2017-10-24	
Zinc, total	0.0058	N/A	0.0040 mg/L	2017-10-23	2017-10-24	

Sample ID: Rai well #1 (7101356-03) [Water] Sampled: 2017-10-16 13:25

Anions

Chloride	24.3	N/A	0.10 mg/L	N/A	2017-10-18	
Fluoride	< 0.10	N/A	0.10 mg/L	N/A	2017-10-18	
Nitrate (as N)	0.705	N/A	0.010 mg/L	N/A	2017-10-18	
Nitrite (as N)	< 0.010	N/A	0.010 mg/L	N/A	2017-10-18	
Sulfate	5.2	N/A	1.0 mg/L	N/A	2017-10-18	

General Parameters

Alkalinity, Total (as CaCO ₃)	118	N/A	1.0 mg/L	N/A	2017-10-18	
Alkalinity, Phenolphthalein (as CaCO ₃)	< 1.0	N/A	1.0 mg/L	N/A	2017-10-18	
Alkalinity, Bicarbonate (as CaCO ₃)	118	N/A	1.0 mg/L	N/A	2017-10-18	
Alkalinity, Carbonate (as CaCO ₃)	< 1.0	N/A	1.0 mg/L	N/A	2017-10-18	
Alkalinity, Hydroxide (as CaCO ₃)	< 1.0	N/A	1.0 mg/L	N/A	2017-10-18	
Colour, True	< 5.0	N/A	5.0 CU	N/A	2017-10-19	
Conductivity (EC)	313	N/A	2.0 µS/cm	N/A	2017-10-18	
Cyanide, Total	< 0.0020	N/A	0.0020 mg/L	N/A	2017-10-20	
pH	7.59	N/A	0.10 pH units	N/A	2017-10-18	HT2
Temperature, at pH	22	N/A	°C	N/A	2017-10-18	HT2
Turbidity	0.25	N/A	0.10 NTU	N/A	2017-10-19	

Calculated Parameters

Hardness, Total (as CaCO ₃)	135	N/A	0.500 mg/L	N/A	N/A	
Langelier Index	-0.3	N/A	-5.0 -	N/A	2017-10-26	
Solids, Total Dissolved (calc)	157	N/A	1.00 mg/L	N/A	N/A	

Total Metals

Aluminum, total	< 0.0050	N/A	0.0050 mg/L	2017-10-23	2017-10-24	
Antimony, total	< 0.00020	N/A	0.00020 mg/L	2017-10-23	2017-10-24	
Arsenic, total	< 0.00050	N/A	0.00050 mg/L	2017-10-23	2017-10-24	
Barium, total	0.0155	N/A	0.0050 mg/L	2017-10-23	2017-10-24	
Boron, total	0.0171	N/A	0.0050 mg/L	2017-10-23	2017-10-24	
Cadmium, total	0.000014	N/A	0.000010 mg/L	2017-10-23	2017-10-24	
Calcium, total	29.5	N/A	0.20 mg/L	2017-10-23	2017-10-24	
Chromium, total	0.00105	N/A	0.00050 mg/L	2017-10-23	2017-10-24	
Cobalt, total	< 0.00010	N/A	0.00010 mg/L	2017-10-23	2017-10-24	
Copper, total	0.00114	N/A	0.00040 mg/L	2017-10-23	2017-10-24	
Iron, total	0.029	N/A	0.010 mg/L	2017-10-23	2017-10-24	
Lead, total	< 0.00020	N/A	0.00020 mg/L	2017-10-23	2017-10-24	

Full Spectrum Analysis—Well Water

SAMPLE ANALYTICAL DATA

REPORTED TO PROJECT Parksville, City of
Drinking Water Pkg

WORK ORDER REPORTED 7101356
2017-10-26

Analyte	Result / Recovery	Standard / Guideline	MRL / Units Limits	Prepared	Analyzed	Notes
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Sample ID: Rai well #1 (7101356-03) [Water] Sampled: 2017-10-16 13:25, Continued

<i>Total Metals, Continued</i>						
Magnesium, total	15.0	N/A	0.010 mg/L	2017-10-23	2017-10-24	
Manganese, total	0.00892	N/A	0.00020 mg/L	2017-10-23	2017-10-24	
Mercury, total	< 0.000010	N/A	0.000010 mg/L	2017-10-23	2017-10-24	
Molybdenum, total	0.00040	N/A	0.00010 mg/L	2017-10-23	2017-10-24	
Nickel, total	< 0.00040	N/A	0.00040 mg/L	2017-10-23	2017-10-24	
Potassium, total	0.72	N/A	0.10 mg/L	2017-10-23	2017-10-24	
Selenium, total	< 0.00050	N/A	0.00050 mg/L	2017-10-23	2017-10-24	
Sodium, total	7.87	N/A	0.10 mg/L	2017-10-23	2017-10-24	
Strontium, total	0.0896	N/A	0.0010 mg/L	2017-10-23	2017-10-24	
Uranium, total	0.000288	N/A	0.000020 mg/L	2017-10-23	2017-10-24	
Zinc, total	0.0049	N/A	0.0040 mg/L	2017-10-23	2017-10-24	

Sample ID: Rai well #8 (7101356-04) [Water] Sampled: 2017-10-16 13:15

<i>Anions</i>						
Chloride	31.7	N/A	0.10 mg/L	N/A	2017-10-18	
Fluoride	< 0.10	N/A	0.10 mg/L	N/A	2017-10-18	
Nitrate (as N)	0.524	N/A	0.010 mg/L	N/A	2017-10-18	
Nitrite (as N)	< 0.010	N/A	0.010 mg/L	N/A	2017-10-18	
Sulfate	7.2	N/A	1.0 mg/L	N/A	2017-10-18	
<i>General Parameters</i>						
Alkalinity, Total (as CaCO3)	118	N/A	1.0 mg/L	N/A	2017-10-18	
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	N/A	1.0 mg/L	N/A	2017-10-18	
Alkalinity, Bicarbonate (as CaCO3)	118	N/A	1.0 mg/L	N/A	2017-10-18	
Alkalinity, Carbonate (as CaCO3)	< 1.0	N/A	1.0 mg/L	N/A	2017-10-18	
Alkalinity, Hydroxide (as CaCO3)	< 1.0	N/A	1.0 mg/L	N/A	2017-10-18	
Colour, True	< 5.0	N/A	5.0 CU	N/A	2017-10-19	
Conductivity (EC)	340	N/A	2.0 µS/cm	N/A	2017-10-18	
Cyanide, Total	< 0.0020	N/A	0.0020 mg/L	N/A	2017-10-20	
pH	7.56	N/A	0.10 pH units	N/A	2017-10-18	HT2
Temperature, at pH	23	N/A	°C	N/A	2017-10-18	HT2
Turbidity	< 0.10	N/A	0.10 NTU	N/A	2017-10-19	
<i>Calculated Parameters</i>						
Hardness, Total (as CaCO3)	151	N/A	0.500 mg/L	N/A	N/A	
Langelier Index	-0.3	N/A	-5.0 -	N/A	2017-10-26	
Solids, Total Dissolved (calc)	172	N/A	1.00 mg/L	N/A	N/A	
<i>Total Metals</i>						
Aluminum, total	< 0.0050	N/A	0.0050 mg/L	2017-10-23	2017-10-24	
Antimony, total	< 0.00020	N/A	0.00020 mg/L	2017-10-23	2017-10-24	
Arsenic, total	< 0.00050	N/A	0.00050 mg/L	2017-10-23	2017-10-24	
Barium, total	0.0076	N/A	0.0050 mg/L	2017-10-23	2017-10-24	
Boron, total	0.0107	N/A	0.0050 mg/L	2017-10-23	2017-10-24	
Cadmium, total	0.000044	N/A	0.000010 mg/L	2017-10-23	2017-10-24	
Calcium, total	33.6	N/A	0.20 mg/L	2017-10-23	2017-10-24	

Appendix E



SAMPLE ANALYTICAL DATA

REPORTED TO PROJECT Parksville, City of Drinking Water Pkg

WORK ORDER REPORTED 7101356 2017-10-26

Analyte	Result / Recovery	Standard / Guideline	MRL / Limits	Units	Prepared	Analyzed	Notes
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Sample ID: Rai well #8 (7101356-04) [Water] Sampled: 2017-10-16 13:15, Continued

Total Metals, Continued

Chromium, total	0.00081	N/A	0.00050	mg/L	2017-10-23	2017-10-24	
Cobalt, total	< 0.00010	N/A	0.00010	mg/L	2017-10-23	2017-10-24	
Copper, total	0.0482	N/A	0.00040	mg/L	2017-10-23	2017-10-24	
Iron, total	< 0.010	N/A	0.010	mg/L	2017-10-23	2017-10-24	
Lead, total	0.0317	N/A	0.00020	mg/L	2017-10-23	2017-10-24	
Magnesium, total	16.2	N/A	0.010	mg/L	2017-10-23	2017-10-24	
Manganese, total	0.0202	N/A	0.00020	mg/L	2017-10-23	2017-10-24	
Mercury, total	< 0.000010	N/A	0.000010	mg/L	2017-10-23	2017-10-24	
Molybdenum, total	0.00012	N/A	0.00010	mg/L	2017-10-23	2017-10-24	
Nickel, total	0.00050	N/A	0.00040	mg/L	2017-10-23	2017-10-24	
Potassium, total	0.60	N/A	0.10	mg/L	2017-10-23	2017-10-24	
Selenium, total	< 0.00050	N/A	0.00050	mg/L	2017-10-23	2017-10-24	
Sodium, total	8.12	N/A	0.10	mg/L	2017-10-23	2017-10-24	
Strontium, total	0.0913	N/A	0.0010	mg/L	2017-10-23	2017-10-24	
Uranium, total	0.000189	N/A	0.000020	mg/L	2017-10-23	2017-10-24	
Zinc, total	0.0501	N/A	0.0040	mg/L	2017-10-23	2017-10-24	

Sample ID: River (7101356-05) [Water] Sampled: 2017-10-16 12:45

Anions

Chloride	20.0	N/A	0.10	mg/L	N/A	2017-10-18	
Fluoride	< 0.10	N/A	0.10	mg/L	N/A	2017-10-18	
Nitrate (as N)	0.013	N/A	0.010	mg/L	N/A	2017-10-18	
Nitrite (as N)	< 0.010	N/A	0.010	mg/L	N/A	2017-10-18	
Sulfate	2.1	N/A	1.0	mg/L	N/A	2017-10-18	

General Parameters

Alkalinity, Total (as CaCO3)	28.7	N/A	1.0	mg/L	N/A	2017-10-18	
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	N/A	1.0	mg/L	N/A	2017-10-18	
Alkalinity, Bicarbonate (as CaCO3)	28.7	N/A	1.0	mg/L	N/A	2017-10-18	
Alkalinity, Carbonate (as CaCO3)	< 1.0	N/A	1.0	mg/L	N/A	2017-10-18	
Alkalinity, Hydroxide (as CaCO3)	< 1.0	N/A	1.0	mg/L	N/A	2017-10-18	
Colour, True	5.5	N/A	5.0	CU	N/A	2017-10-19	
Conductivity (EC)	131	N/A	2.0	µS/cm	N/A	2017-10-18	
Cyanide, Total	< 0.0020	N/A	0.0020	mg/L	N/A	2017-10-20	
pH	7.04	N/A	0.10	pH units	N/A	2017-10-18	HT2
Temperature, at pH	23	N/A		°C	N/A	2017-10-18	HT2
Turbidity	0.27	N/A	0.10	NTU	N/A	2017-10-19	

Calculated Parameters

Hardness, Total (as CaCO3)	41.8	N/A	0.500	mg/L	N/A	N/A	
Langelier Index	-1.8	N/A	-5.0	-	N/A	2017-10-26	
Solids, Total Dissolved (calc)	64.1	N/A	1.00	mg/L	N/A	N/A	

Total Metals

Aluminum, total	0.0119	N/A	0.0050	mg/L	2017-10-23	2017-10-24	
Antimony, total	< 0.00020	N/A	0.00020	mg/L	2017-10-23	2017-10-24	

Full Spectrum Analysis—Well Water

Appendix E



SAMPLE ANALYTICAL DATA

REPORTED TO PROJECT Parkville, City of Drinking Water Pkg

WORK ORDER REPORTED 7101356 2017-10-26

Analyte	Result / Recovery	Standard / Guideline	MRL / Limits	Units	Prepared	Analyzed	Notes
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Sample ID: River (7101356-05) [Water] Sampled: 2017-10-16 12:45, Continued

<i>Total Metals, Continued</i>							
Arsenic, total	< 0.00050	N/A	0.00050	mg/L	2017-10-23	2017-10-24	
Barium, total	0.0087	N/A	0.0050	mg/L	2017-10-23	2017-10-24	
Boron, total	0.0185	N/A	0.0050	mg/L	2017-10-23	2017-10-24	
Cadmium, total	< 0.000010	N/A	0.000010	mg/L	2017-10-23	2017-10-24	
Calcium, total	13.6	N/A	0.20	mg/L	2017-10-23	2017-10-24	
Chromium, total	< 0.00050	N/A	0.00050	mg/L	2017-10-23	2017-10-24	
Cobalt, total	< 0.00010	N/A	0.00010	mg/L	2017-10-23	2017-10-24	
Copper, total	0.00084	N/A	0.00040	mg/L	2017-10-23	2017-10-24	
Iron, total	0.074	N/A	0.010	mg/L	2017-10-23	2017-10-24	
Lead, total	< 0.00020	N/A	0.00020	mg/L	2017-10-23	2017-10-24	
Magnesium, total	1.92	N/A	0.010	mg/L	2017-10-23	2017-10-24	
Manganese, total	0.00706	N/A	0.00020	mg/L	2017-10-23	2017-10-24	
Mercury, total	< 0.000010	N/A	0.000010	mg/L	2017-10-23	2017-10-24	
Molybdenum, total	0.00011	N/A	0.00010	mg/L	2017-10-23	2017-10-24	
Nickel, total	< 0.00040	N/A	0.00040	mg/L	2017-10-23	2017-10-24	
Potassium, total	0.18	N/A	0.10	mg/L	2017-10-23	2017-10-24	
Selenium, total	< 0.00050	N/A	0.00050	mg/L	2017-10-23	2017-10-24	
Sodium, total	8.77	N/A	0.10	mg/L	2017-10-23	2017-10-24	
Strontium, total	0.0619	N/A	0.0010	mg/L	2017-10-23	2017-10-24	
Uranium, total	< 0.000020	N/A	0.000020	mg/L	2017-10-23	2017-10-24	
Zinc, total	< 0.0040	N/A	0.0040	mg/L	2017-10-23	2017-10-24	

Sample ID: 1116 Herring Gull (7101356-06) [Water] Sampled: 2017-10-16 13:35

<i>Anions</i>							
Chloride	21.8	N/A	0.10	mg/L	N/A	2017-10-18	
Fluoride	< 0.10	N/A	0.10	mg/L	N/A	2017-10-18	
Nitrate (as N)	0.021	N/A	0.010	mg/L	N/A	2017-10-18	
Nitrite (as N)	< 0.010	N/A	0.010	mg/L	N/A	2017-10-18	
Sulfate	2.0	N/A	1.0	mg/L	N/A	2017-10-18	
<i>General Parameters</i>							
Alkalinity, Total (as CaCO3)	28.1	N/A	1.0	mg/L	N/A	2017-10-18	
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	N/A	1.0	mg/L	N/A	2017-10-18	
Alkalinity, Bicarbonate (as CaCO3)	28.1	N/A	1.0	mg/L	N/A	2017-10-18	
Alkalinity, Carbonate (as CaCO3)	< 1.0	N/A	1.0	mg/L	N/A	2017-10-18	
Alkalinity, Hydroxide (as CaCO3)	< 1.0	N/A	1.0	mg/L	N/A	2017-10-18	
Colour, True	< 5.0	N/A	5.0	CU	N/A	2017-10-19	
Conductivity (EC)	132	N/A	2.0	µS/cm	N/A	2017-10-18	
Cyanide, Total	< 0.0020	N/A	0.0020	mg/L	N/A	2017-10-20	
pH	6.90	N/A	0.10	pH units	N/A	2017-10-18	HT2
Temperature, at pH	22	N/A		°C	N/A	2017-10-18	HT2
Turbidity	0.15	N/A	0.10	NTU	N/A	2017-10-19	
<i>Calculated Parameters</i>							
Hardness, Total (as CaCO3)	41.0	N/A	0.500	mg/L	N/A	N/A	

Full Spectrum Analysis—Well Water

Appendix E



SAMPLE ANALYTICAL DATA

REPORTED TO PROJECT Parksville, City of Drinking Water Pkg

WORK ORDER REPORTED 7101356 2017-10-26

Analyte	Result / Recovery	Standard / Guideline	MRL / Units / Limits	Prepared	Analyzed	Notes
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Sample ID: 1116 Herring Gull (7101356-06) [Water] Sampled: 2017-10-16 13:35, Continued

Calculated Parameters, Continued

Langelier Index	-2.0	N/A	-5.0 -	N/A	2017-10-26	
Solids, Total Dissolved (calc)	64.9	N/A	1.00 mg/L	N/A	N/A	

Total Metals

Aluminum, total	0.0064	N/A	0.0050 mg/L	2017-10-23	2017-10-24	
Antimony, total	< 0.00020	N/A	0.00020 mg/L	2017-10-23	2017-10-24	
Arsenic, total	< 0.00050	N/A	0.00050 mg/L	2017-10-23	2017-10-24	
Barium, total	0.0084	N/A	0.0050 mg/L	2017-10-23	2017-10-24	
Boron, total	0.0186	N/A	0.0050 mg/L	2017-10-23	2017-10-24	
Cadmium, total	< 0.000010	N/A	0.000010 mg/L	2017-10-23	2017-10-24	
Calcium, total	13.3	N/A	0.20 mg/L	2017-10-23	2017-10-24	
Chromium, total	< 0.00050	N/A	0.00050 mg/L	2017-10-23	2017-10-24	
Cobalt, total	< 0.00010	N/A	0.00010 mg/L	2017-10-23	2017-10-24	
Copper, total	0.0183	N/A	0.00040 mg/L	2017-10-23	2017-10-24	
Iron, total	0.049	N/A	0.010 mg/L	2017-10-23	2017-10-24	
Lead, total	0.00063	N/A	0.00020 mg/L	2017-10-23	2017-10-24	
Magnesium, total	1.87	N/A	0.010 mg/L	2017-10-23	2017-10-24	
Manganese, total	0.00097	N/A	0.00020 mg/L	2017-10-23	2017-10-24	
Mercury, total	< 0.000010	N/A	0.000010 mg/L	2017-10-23	2017-10-24	
Molybdenum, total	< 0.00010	N/A	0.00010 mg/L	2017-10-23	2017-10-24	
Nickel, total	< 0.00040	N/A	0.00040 mg/L	2017-10-23	2017-10-24	
Potassium, total	0.17	N/A	0.10 mg/L	2017-10-23	2017-10-24	
Selenium, total	< 0.00050	N/A	0.00050 mg/L	2017-10-23	2017-10-24	
Sodium, total	8.48	N/A	0.10 mg/L	2017-10-23	2017-10-24	
Strontium, total	0.0597	N/A	0.0010 mg/L	2017-10-23	2017-10-24	
Uranium, total	< 0.000020	N/A	0.000020 mg/L	2017-10-23	2017-10-24	
Zinc, total	0.0088	N/A	0.0040 mg/L	2017-10-23	2017-10-24	

Sample / Analysis Qualifiers:

HT2 The 15 minute recommended holding time (from sampling to analysis) has been exceeded - field analysis is recommended.

Appendix F



SAMPLE ANALYTICAL DATA

REPORTED TO PROJECT Parkville, City of
361341 - THM Quarterly (Island Health)

WORK ORDER REPORTED 7021147
2017-02-27

Analyte	Result / Recovery	Standard / Guideline	MRL / Units	Prepared	Analyzed	Notes
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Sample ID: Temple (7021147-01) [Water] Sampled: 2017-02-20 08:30

Calculated Parameters

Total Trihalomethanes	< 0.004	N/A	0.004 mg/L	N/A	N/A	
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Volatile Organic Compounds (VOC)

Bromodichloromethane	0.001	N/A	0.001 mg/L	N/A	2017-02-22	
Bromoform	< 0.001	N/A	0.001 mg/L	N/A	2017-02-22	
Chloroform	< 0.001	N/A	0.001 mg/L	N/A	2017-02-22	
Dibromochloromethane	0.002	N/A	0.001 mg/L	N/A	2017-02-22	
Surrogate: Toluene-d8	130		70-130 %	N/A	2017-02-22	
Surrogate: 4-Bromofluorobenzene	119		70-130 %	N/A	2017-02-22	

Sample ID: 1116 Herring Gull (7021147-02) [Water] Sampled: 2017-02-20 08:55

Calculated Parameters

Total Trihalomethanes	0.004	N/A	0.004 mg/L	N/A	N/A	
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Volatile Organic Compounds (VOC)

Bromodichloromethane	0.001	N/A	0.001 mg/L	N/A	2017-02-22	
Bromoform	< 0.001	N/A	0.001 mg/L	N/A	2017-02-22	
Chloroform	< 0.001	N/A	0.001 mg/L	N/A	2017-02-22	
Dibromochloromethane	0.002	N/A	0.001 mg/L	N/A	2017-02-22	
Surrogate: Toluene-d8	130		70-130 %	N/A	2017-02-22	
Surrogate: 4-Bromofluorobenzene	121		70-130 %	N/A	2017-02-22	

Sample ID: Ermineskin (7021147-03) [Water] Sampled: 2017-02-20 08:40

Calculated Parameters

Total Trihalomethanes	< 0.004	N/A	0.004 mg/L	N/A	N/A	
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Volatile Organic Compounds (VOC)

Bromodichloromethane	< 0.001	N/A	0.001 mg/L	N/A	2017-02-22	
Bromoform	< 0.001	N/A	0.001 mg/L	N/A	2017-02-22	
Chloroform	< 0.001	N/A	0.001 mg/L	N/A	2017-02-22	
Dibromochloromethane	0.001	N/A	0.001 mg/L	N/A	2017-02-22	
Surrogate: Toluene-d8	129		70-130 %	N/A	2017-02-22	
Surrogate: 4-Bromofluorobenzene	121		70-130 %	N/A	2017-02-22	

Sample ID: Community Park (7021147-04) [Water] Sampled: 2017-02-20 08:15

Calculated Parameters

Total Trihalomethanes	< 0.004	N/A	0.004 mg/L	N/A	N/A	
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Volatile Organic Compounds (VOC)

Bromodichloromethane	0.001	N/A	0.001 mg/L	N/A	2017-02-22	
Bromoform	< 0.001	N/A	0.001 mg/L	N/A	2017-02-22	
Chloroform	< 0.001	N/A	0.001 mg/L	N/A	2017-02-22	
Dibromochloromethane	0.002	N/A	0.001 mg/L	N/A	2017-02-22	
Surrogate: Toluene-d8	127		70-130 %	N/A	2017-02-22	
Surrogate: 4-Bromofluorobenzene	119		70-130 %	N/A	2017-02-22	

THM Analysis

Appendix F



SAMPLE ANALYTICAL DATA

REPORTED TO PROJECT Parksville, City of
361341 - THM Quarterly (Island Health)

WORK ORDER REPORTED 7060393
2017-06-07

Analyte	Result / Recovery	Standard / Guideline	MRL / Units Limits	Prepared	Analyzed	Notes
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Sample ID: Temple (7060393-01) [Water] Sampled: 2017-06-05 09:25

<i>Calculated Parameters</i>						
Total Trihalomethanes	0.0145	N/A	0.00400 mg/L	N/A	N/A	
<i>Volatile Organic Compounds (VOC)</i>						
Bromodichloromethane	0.003	N/A	0.001 mg/L	N/A	2017-06-07	
Bromoform	0.001	N/A	0.001 mg/L	N/A	2017-06-07	
Chloroform	0.008	N/A	0.001 mg/L	N/A	2017-06-07	
Dibromochloromethane	0.003	N/A	0.001 mg/L	N/A	2017-06-07	
Surrogate: Toluene-d8	114		70-130 %	N/A	2017-06-07	
Surrogate: 4-Bromofluorobenzene	101		70-130 %	N/A	2017-06-07	

Sample ID: PW 1116 Herring Gull (7060393-02) [Water] Sampled: 2017-06-05 10:00

<i>Calculated Parameters</i>						
Total Trihalomethanes	0.0181	N/A	0.00400 mg/L	N/A	N/A	
<i>Volatile Organic Compounds (VOC)</i>						
Bromodichloromethane	0.001	N/A	0.001 mg/L	N/A	2017-06-07	
Bromoform	< 0.001	N/A	0.001 mg/L	N/A	2017-06-07	
Chloroform	0.017	N/A	0.001 mg/L	N/A	2017-06-07	
Dibromochloromethane	< 0.001	N/A	0.001 mg/L	N/A	2017-06-07	
Surrogate: Toluene-d8	113		70-130 %	N/A	2017-06-07	
Surrogate: 4-Bromofluorobenzene	99		70-130 %	N/A	2017-06-07	

Sample ID: Ermineskin (7060393-03) [Water] Sampled: 2017-06-05 09:40

<i>Calculated Parameters</i>						
Total Trihalomethanes	< 0.00400	N/A	0.00400 mg/L	N/A	N/A	
<i>Volatile Organic Compounds (VOC)</i>						
Bromodichloromethane	< 0.001	N/A	0.001 mg/L	N/A	2017-06-07	
Bromoform	< 0.001	N/A	0.001 mg/L	N/A	2017-06-07	
Chloroform	< 0.001	N/A	0.001 mg/L	N/A	2017-06-07	
Dibromochloromethane	0.002	N/A	0.001 mg/L	N/A	2017-06-07	
Surrogate: Toluene-d8	113		70-130 %	N/A	2017-06-07	
Surrogate: 4-Bromofluorobenzene	101		70-130 %	N/A	2017-06-07	

Sample ID: Community Park (7060393-04) [Water] Sampled: 2017-06-05 09:10

<i>Calculated Parameters</i>						
Total Trihalomethanes	0.0170	N/A	0.00400 mg/L	N/A	N/A	
<i>Volatile Organic Compounds (VOC)</i>						
Bromodichloromethane	0.001	N/A	0.001 mg/L	N/A	2017-06-07	
Bromoform	< 0.001	N/A	0.001 mg/L	N/A	2017-06-07	
Chloroform	0.016	N/A	0.001 mg/L	N/A	2017-06-07	
Dibromochloromethane	< 0.001	N/A	0.001 mg/L	N/A	2017-06-07	
Surrogate: Toluene-d8	114		70-130 %	N/A	2017-06-07	
Surrogate: 4-Bromofluorobenzene	100		70-130 %	N/A	2017-06-07	

THM Analysis

Appendix F



SAMPLE ANALYTICAL DATA

REPORTED TO PROJECT Parksville, City of
361341 - THM Quarterly (Island Health)

WORK ORDER REPORTED 7081189
2017-08-21

Analyte	Result / Recovery	Standard / Guideline	MRL / Units Limits	Prepared	Analyzed	Notes
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Sample ID: Temple (7081189-01) [Water] Sampled: 2017-08-14 08:55

Calculated Parameters						
Total Trihalomethanes	0.0165	N/A	0.00400 mg/L	N/A	N/A	
Volatile Organic Compounds (VOC)						
Bromodichloromethane	0.0046	N/A	0.0010 mg/L	N/A	2017-08-18	
Bromoform	0.0014	N/A	0.0010 mg/L	N/A	2017-08-18	
Chloroform	0.0061	N/A	0.0010 mg/L	N/A	2017-08-18	
Dibromochloromethane	0.0045	N/A	0.0010 mg/L	N/A	2017-08-18	
Surrogate: Toluene-d8	86		70-130 %	N/A	2017-08-18	
Surrogate: 4-Bromofluorobenzene	82		70-130 %	N/A	2017-08-18	

Sample ID: Community Park (7081189-02) [Water] Sampled: 2017-08-14 08:40

Calculated Parameters						
Total Trihalomethanes	0.0234	N/A	0.00400 mg/L	N/A	N/A	
Volatile Organic Compounds (VOC)						
Bromodichloromethane	0.0042	N/A	0.0010 mg/L	N/A	2017-08-18	
Bromoform	< 0.0010	N/A	0.0010 mg/L	N/A	2017-08-18	
Chloroform	0.0191	N/A	0.0010 mg/L	N/A	2017-08-18	
Dibromochloromethane	< 0.0010	N/A	0.0010 mg/L	N/A	2017-08-18	
Surrogate: Toluene-d8	86		70-130 %	N/A	2017-08-18	
Surrogate: 4-Bromofluorobenzene	82		70-130 %	N/A	2017-08-18	

Sample ID: Ermineskin (7081189-03) [Water] Sampled: 2017-08-14 09:05

Calculated Parameters						
Total Trihalomethanes	0.00548	N/A	0.00400 mg/L	N/A	N/A	
Volatile Organic Compounds (VOC)						
Bromodichloromethane	0.0015	N/A	0.0010 mg/L	N/A	2017-08-18	
Bromoform	0.0013	N/A	0.0010 mg/L	N/A	2017-08-18	
Chloroform	< 0.0010	N/A	0.0010 mg/L	N/A	2017-08-18	
Dibromochloromethane	0.0026	N/A	0.0010 mg/L	N/A	2017-08-18	
Surrogate: Toluene-d8	85		70-130 %	N/A	2017-08-18	
Surrogate: 4-Bromofluorobenzene	81		70-130 %	N/A	2017-08-18	

Sample ID: PW 1116 Herring Gull (7081189-04) [Water] Sampled: 2017-08-14 09:25

Calculated Parameters						
Total Trihalomethanes	0.0240	N/A	0.00400 mg/L	N/A	N/A	
Volatile Organic Compounds (VOC)						
Bromodichloromethane	0.0042	N/A	0.0010 mg/L	N/A	2017-08-18	
Bromoform	< 0.0010	N/A	0.0010 mg/L	N/A	2017-08-18	
Chloroform	0.0198	N/A	0.0010 mg/L	N/A	2017-08-18	
Dibromochloromethane	< 0.0010	N/A	0.0010 mg/L	N/A	2017-08-18	
Surrogate: Toluene-d8	87		70-130 %	N/A	2017-08-18	
Surrogate: 4-Bromofluorobenzene	84		70-130 %	N/A	2017-08-18	

THM Analysis

Appendix F



SAMPLE ANALYTICAL DATA

REPORTED TO PROJECT Parksville, City of
361341 - THM Quarterly (Island Health)

WORK ORDER REPORTED 7102772
2017-11-06

Analyte	Result / Recovery	Standard / Guideline	MRL / Units Limits	Prepared	Analyzed	Notes
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Sample ID: Community Park (7102772-01) [Water] Sampled: 2017-10-30 10:30

<i>Calculated Parameters</i>						
Total Trihalomethanes	0.0132	N/A	0.00400 mg/L	N/A	N/A	
<i>Volatile Organic Compounds (VOC)</i>						
Bromodichloromethane	0.0036	N/A	0.0010 mg/L	N/A	2017-11-03	
Bromoform	0.0018	N/A	0.0010 mg/L	N/A	2017-11-03	
Chloroform	0.0034	N/A	0.0010 mg/L	N/A	2017-11-03	
Dibromochloromethane	0.0044	N/A	0.0010 mg/L	N/A	2017-11-03	
Surrogate: Toluene-d8	100		70-130 %	N/A	2017-11-03	
Surrogate: 4-Bromofluorobenzene	88		70-130 %	N/A	2017-11-03	

Sample ID: Temple (7102772-02) [Water] Sampled: 2017-10-30 10:40

<i>Calculated Parameters</i>						
Total Trihalomethanes	0.00527	N/A	0.00400 mg/L	N/A	N/A	
<i>Volatile Organic Compounds (VOC)</i>						
Bromodichloromethane	0.0014	N/A	0.0010 mg/L	N/A	2017-11-03	
Bromoform	0.0014	N/A	0.0010 mg/L	N/A	2017-11-03	
Chloroform	< 0.0010	N/A	0.0010 mg/L	N/A	2017-11-03	
Dibromochloromethane	0.0026	N/A	0.0010 mg/L	N/A	2017-11-03	
Surrogate: Toluene-d8	98		70-130 %	N/A	2017-11-03	
Surrogate: 4-Bromofluorobenzene	89		70-130 %	N/A	2017-11-03	

Sample ID: Ermineskin (7102772-03) [Water] Sampled: 2017-10-30 10:50

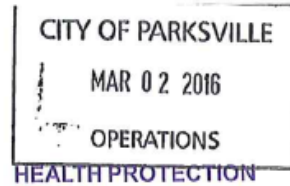
<i>Calculated Parameters</i>						
Total Trihalomethanes	< 0.00400	N/A	0.00400 mg/L	N/A	N/A	
<i>Volatile Organic Compounds (VOC)</i>						
Bromodichloromethane	< 0.0010	N/A	0.0010 mg/L	N/A	2017-11-03	
Bromoform	0.0011	N/A	0.0010 mg/L	N/A	2017-11-03	
Chloroform	< 0.0010	N/A	0.0010 mg/L	N/A	2017-11-03	
Dibromochloromethane	0.0018	N/A	0.0010 mg/L	N/A	2017-11-03	
Surrogate: Toluene-d8	100		70-130 %	N/A	2017-11-03	
Surrogate: 4-Bromofluorobenzene	89		70-130 %	N/A	2017-11-03	

Sample ID: PW 1116 Herring Gull (7102772-04) [Water] Sampled: 2017-10-30 11:00

<i>Calculated Parameters</i>						
Total Trihalomethanes	0.00973	N/A	0.00400 mg/L	N/A	N/A	
<i>Volatile Organic Compounds (VOC)</i>						
Bromodichloromethane	0.0024	N/A	0.0010 mg/L	N/A	2017-11-03	
Bromoform	0.0018	N/A	0.0010 mg/L	N/A	2017-11-03	
Chloroform	0.0018	N/A	0.0010 mg/L	N/A	2017-11-03	
Dibromochloromethane	0.0038	N/A	0.0010 mg/L	N/A	2017-11-03	
Surrogate: Toluene-d8	99		70-130 %	N/A	2017-11-03	
Surrogate: 4-Bromofluorobenzene	89		70-130 %	N/A	2017-11-03	

THM Analysis

Appendix G



PERMIT to OPERATE

A WATER SUPPLY SYSTEM
A Drinking Water System with 301- 10.000 connections

Water System Name: **PARKSVILLE, WWS**
Premises Number: **1310814**

Premises Address: **1116 Herring Gull Way
Parksville, BC
V9P 2H3**

Water System Owner: **City of Parksville**

City of Parksville is hereby permitted to operate the above potable water supply system and is required to operate this system in accordance with the Drinking Water Protection Act and in accordance with the conditions set out in this operating permit and conditions established as part of any construction permit.

The water supply system for which this operating permit applies is generally described as:

Service Delivery Area: **Englishman River Water Service Area**
Source Water: **Multiple wells & Englishman River (May to October)**
Water Treatment methods are: **None**
Water Disinfection methods are: **Chlorination (liquid & gas).**

Number of Connections **301-10,000 Connections - DWT**

Operating conditions specific to this water supply system are in Appendix A.

Date: July 1, 1992

Issued By: 
Environmental Health Officer

**This permit must be displayed
in a conspicuous place and is not transferable**

Place Decal Here

Water System Operating Conditions

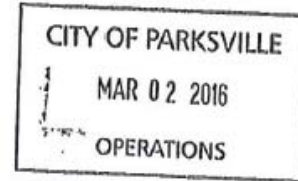
Appendix G

Excellent health and care for everyone,
everywhere, everytime.



March 1, 2016

Mike Squire
Program Manager
Englishman River Water Service
1116 Herring Gull Way
PO Box 1390
Parksville, BC V9P 2H3



Dear Mike:

**Re: Changes to Terms and Conditions of the City of Parksville Water System
Operating Permit**

Please find enclosed an amended operating permit issued under section 8(4) of the *Drinking Water Protection Act* (the "Act"). The terms and conditions are attached as Appendix A (Operational) and Appendix B (Surface Water Treatment Objectives) and are effective **March 1, 2016**.

The terms and conditions, Appendix A dated April, 2009 is hereby rescinded.

In accordance to section 8(1)(b) of the Act, the water supply system must be operated in accordance with these terms and conditions. It is understood that Appendix B timeframes are target dates. Large construction projects may encounter unforeseen delays which may prohibit the completion of the project by the listed dates.

Upon completion of the water treatment plant, this proposed permit will have to be amended to reflect the new works. At that time the City of Parksville will have to request an amendment to their Operating Permit. For example, performance standards for the selected filtration technology would be listed on the Operating Permit but are not reflected in this Permit.

Please also note that water suppliers have various responsibilities under the Act and the *Drinking Water Protection Regulation* (The "Regulation"), beyond those set out as terms and conditions of the operating permit. It is your responsibility to familiarize yourself with the Act and Regulations. See section 2.2 of part A of the *Drinking Water Officer's Guide* for a summary of responsibilities and references to some of the relevant provisions of the Act and Regulation. This is intended for basic information purposes only.

If you have any questions about this operating permit, please do not hesitate to contact me at (250) 947.8222 or by email at bill.wrathall@viha.ca

Health Protection and Environmental Services
489 Alberni Highway, Parksville, BC V9P 1J9

Phone: 250-947-8222
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Water System Operating Conditions

Appendix G

March 1, 2016

Appendix A - Operational

Water System Operating Permit Terms and Conditions For the Current City of Parksville Water System

The permit holder is advised the following Terms and Conditions are in addition to other legislated responsibilities and obligations such as:

- The Drinking Water Protection Act, ([SBC 2001] Chapter 9
 - The Drinking Water Protection Regulation (B.C. Reg. 200/2003 O.C. 508/2003)
1. Adhere to monitoring requirements to ensure the efficacy of disinfection and/or treatment technology. Provide a minimum of 0.2 mg/L of residual disinfectant, measured as *free* chlorine for the water entering the system. The level of residual disinfectant at any point within the distribution system should be at least 0.05 mg/L, measured as *total or free* chlorine.

If detectable levels of chlorine are not observed during routine residual analysis in the distribution system, the water supplier shall obtain water samples and have them analyzed for total coliform and *Escherichia coli*, and undertake any necessary steps to return a chlorine residual as *total* and *free* chlorine.
 2. Provide continuous on-line turbidity monitoring of raw water for the Englishman River during drawing periods (May through October or as applicable) to ensure less than or equal to 1 NTU of turbidity in finished water. Ensure the Emergency Response Plan includes appropriate action for turbidity events as detailed in the "*Decision Tree for Responding to a Turbidity Event in Unfiltered Drinking Water*".
 3. Routine surveillance and evaluation of a source water protection program and emergency response plan to identify and respond to any activity that may impact or cause changes to the source water.
 4. Adhere to a sampling program as approved by the Drinking Water Officer and according to BCWWA standards or equivalent. Maintain records of all monitoring conducted. The sampling program is to include, but is not necessarily limited to, the following:
 - Bacteriological testing at representative locations within the distribution system.
 - Chemical testing in accordance with the *Guidelines Canadian Drinking Water Quality* or parameters specified in the *VIHA Guidelines for Approval of Water Supply Systems*.
 - Chlorine disinfectant concentration testing at representative locations within the distribution system.
 5. Adhere to maintenance and operating procedures as approved by the Drinking Water Officer and abide by BCWWA standards or equivalent. Maintenance and operating procedures shall address but is not necessarily limited to:
 - Source water and intake protection.

Appendix G

March 1, 2016

Appendix B – Surface Water Treatment Objectives

Water System Operating Permit Terms and Conditions For City of Parksville Water System

The permit holder is advised the following Terms and Conditions are in addition to other legislated responsibilities and obligations such as:

- The *Drinking Water Protection Act*, ([SBC 2001] Chapter 9
- The *Drinking Water Protection Regulation* (B.C. Reg. 200/2003 O.C. 508/2003)

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1. Englishman River water source must be treated in accordance with the *Drinking Water Treatment Objectives (Microbiological) for Surface Water Systems in British Columbia* to achieve the following performance standard:
 - 4-log reduction or inactivation of viruses.
 - 3-log reduction or inactivation of *Giardia* and *Cryptosporidium*.
 - Two treatment processes for surface water.
 - Less than or equal to one (1) nephelometric turbidity unit (NTU) of turbidity in finished water.
 2. Establish an implementation strategy towards meeting the SWTO's with a projected water treatment plant operational date by September 30, 2018. The following timeframes and critical objectives are identified:
 - December 1, 2016 - Submission of construction permit application(s) for the water treatment plant, intake, pump station and transmission mains.
 - March 31, 2017- Construction commencement.
 - June 30, 2018 – Construction complete.
 - July 1, 2018 – Commissioning commences.
 - September 30, 2018 – Plant operational.

If unforeseen and/or extenuating circumstances prevent completion of the water treatment plant by September 30, 2018 the water supplier must notify the Environmental Health Officer (EHO), a minimum of 90 days in advance of the deadline, and provide rationale for the delay. Any changes to the operating permit must be approved by the EHO in writing.

3. Provide formal project updates by the following dates:
 - July 29, 2016.
 - January 27, 2017.
 - July 28, 2017.
 - January 31, 2018.

* Project updates may be written or in presentation format.